









## Downtime by Chad

### Ruthless EOJ routine

I KNOW Americans have a reputation for being ruthless, but it's seldom one gets such a graphic experience of this first hand as I had when I was visiting Los Angeles recently. I was standing in the queue for the hotel desk when I noticed the two out-of-state American gentlemen in front of me were having difficulty with their reservation. They insisted that the booking had been made by their firm. Eventually the manager was called, and he arrived carrying a telex sent to the hotel by their "employer."

"This," said the manager, waving the telex before him, "says that the reservation has been cancelled because you don't work for them any more."

What a way to give someone the sack! The last I saw of the two gentlemen, they were being ushered away to the manager's office in a state of understandable shock. Remember that, the next time you complain about your heartless employers!

### Fit of the gigos

THE DP industry is getting old enough now for people to reminisce about the Good — or Bad — Old Days. An acquaintance of mine was talking about his years in the late Fifties at an IBM installation at a drug company in Hounslow. They were having a lot of difficulty with accuracy of input data, and he set about investigating the staff selection procedures.

Among the denizens of Hounslow, it appeared that those school leavers who could get good jobs would travel to central London for these. Those left would be employed by this firm to deliver the internal post.

Of these, the girls who kept leaving the letters at the wrong offices, or dropping them down the drains, were put in the post room sticking stamps on letters.

Finally, those who kept putting the stamps on the wrong corners, were made data prep operators.

The management, of course, were very impatient with the computer, which didn't seem to be delivering the goods. To paraphrase the old tag, "Who prepares the data preppers?"

## Participative systems design

A BCS survey of DP user requirements was highly critical of the failure of systems designers to include the views of all users in their design specifications (CW, November 2).

A technique of participative systems design aimed at overcoming this type of criticism has been created by three specialists in computers and systems management, ENID MUMFORD of the Manchester Business School, FRANK

LAND, senior lecturer in computers and systems analysis at the London School of Economics and JOHN HAWGOOD, director of the computer laboratory at Durham University.

Their technique sprang from a project initiated by the National Computing Centre about eight years ago to look into the economics of computer systems. The more they looked into this subject, the more they realised it depended primarily on

the way the system was designed.

These techniques have now been implemented at a number of user sites and are specially commissioned series of five articles. Mumford, Land and Hawgood will describe the technique, drawing on their implementation experiences of the technique, which they call "new design methods to cater for the climate of democracy in industry."

Part

# Taking users' needs into full account

DESIGNING systems is a complex and demanding process. Designing systems for a new and rapidly developing technology is also an evolutionary process, one which involves constant learning as new or changing needs are identified in the system environment, and as intellectual approaches which worked well at one time cease to be effective at another.

The design of computer systems today is being increasingly influenced by major social and technical changes. Socially, there has been a shift of power from the top to the bottom of most organisations. This has been accompanied by increasing demands for involvement in decisions that affect lower level workers on the shop floor or in offices and a willingness to use employee power to block change which is viewed as undesirable or disadvantageous. In particular change which is seen as leading to a reduction in jobs.

Technically, the advent of microprocessors, while increasing the potential scope and flexibility of computer systems, seems to some to augur a realisation of the worst employment fears of the past.

The design of computer systems is therefore increasingly becoming a negotiating process in which all interested groups require a role in the analysis of needs, setting of objectives and design activities.

For many types of applications the day of the lone systems designer is over. Therefore new design methods are required to cater for the new climate of democracy and to ensure that users receive the kinds of systems that meet these needs, because they have had a responsibility for the design of the systems.

We have over the past few years been developing a philosophy of system design and for-

ward planning based on staff and user participation and a set of procedures to assist the participants. These will be outlined in this first article and discussed in more detail in four subsequent articles.

All systems design is influenced by people's values and philosophy. Top management values will influence the kind of



Enid Mumford

strategies they use to ensure the economic viability of their organisations and the nature of the human relations climate they wish to create for their staff. The values of the computer professionals will influence the kind of system objectives they set and the importance they attach to such human needs as job satisfaction.

The values of user groups will influence the manner in which they respond to computer systems and their enthusiasm or reluctance to ensure that they work. But values today are in a state of flux, and this is one reason why there is pressure to reformulate these and to develop the new approaches and techniques that will fit a new, and more humanistic, set of values.

The management values of the past have tended to see labour as an expendable, easily replaceable commodity which produces at highest efficiency and lowest cost when few demands are made on it, when work is tightly controlled and when little or no discretion is allowed to the individual worker or to the work group. These values, together with the dominance of a technical ethic, influenced the design of many early computer systems.

Sackman describes the systems design scene of the 50s and 60s in the US in the following way:

"The developing computer ethos assumed an increasing misanthropic visage. Technical matters turned computer professionals on human matters turned them off. Users were troublesome petitioners somewhere at the end of the line who had to be satisfied with what they got, because after a substantial investment, they usually couldn't go elsewhere."

The situation of the 1970s has been very different, but still apparently unsatisfactory. In Britain most systems designers have tried very hard to meet user needs and provide the kinds of systems that users will welcome and appreciate, but frequently they have failed to do this and have been met with a hostile reception from management and subordinates alike.

Can our method help improve this state of affairs? We believe it can, and now have experience of testing it out in six different organisations: a savings bank, a public library, an insurance company and three industrial firms. It is also being applied by groups in Germany and the US.

The approach is based on a clear value position, which can be stated in the following positions:

1. That the individual's work

and work situation can and should be set up in such a way that he or she can do a job that is personally satisfying in a safe and comfortable environment. (The computer can and should be a means for assisting this.)

2. That everyone affected by a system change, including users, customers, management and technologists, can and should be considered in planning it.

3. That employees at all levels can and should analyse their own and their clients' needs and design their own work systems.

4. That the overall approach to systems design and development can and should be based on the approach of enabling the organisation, the group and the individual to cope better with uncertainty.

The argument behind these statements is related both to ethics and to expediency. We believe that people have a moral right to influence the organisation of their own work situation and also that if this right is conceded then there are likely to be gains both in job satisfaction and in efficiency.

Job satisfaction gains, because the group whose job satisfaction is going to be affected by any change is better able to diagnose its own job satisfaction needs than is any outside group of specialists.

Efficiency gains, because the people who are in the change situations are likely to have an excellent knowledge of day-to-day work problems and can make useful contributions to the solution of these.

If users are going to participate in the design of their own systems, then they need both a structure to assist their participation and a set of simple analytical and design tools. These will be described in our next three articles.

Briefly, the participative

approach involves first, creating a structure to assist communication on long-term company strategy. When organisational objectives have been set, a broad system covering areas of departments is being developed, then a design group, representatives of all the interests in these departments, is created.

Lastly, when a sub-system and local procedures are designed for a particular department or section, a design group, consisting of staff being involved in decision-making. Both of these design groups report to management and to each other.

The tools used by the design groups to acquire and include methods for design and evaluation:

1. A method for identifying current efficiency problems.

2. A method for identifying satisfaction needs and constraints.

3. A method for identifying significant trends and opportunities.

4. A method for identifying development goals important to different interest groups.

5. A method for assessing likely benefits of different strategies to different groups. This assists the choice of an effective course of action acceptable to all groups.

6. Detailed socio-technical systems design to ensure the final system meets the needs as well as technical and administrative objectives.

The final article will describe our existing approach to indicate developments that we are now working

## Banks see big savings in cheque scanning system

THE massive cheque handling workload borne by clearing banks could be substantially lightened by a system that captures and processes electronic images of cheques. The system is called Bancr, a name which combines the names of its joint developers, the Bank of America and NCR.

No details have been released yet either of the hardware or software components of the Bancr system, but one of the known essential features is a terminal that will be installed at each bank branch and which will be used to scan both sides of each cheque deposited at the branch, transmitting the image

to a regional cheque image sorting centre serving, typically, about 50 branches.

The system at the centre will be capable of extracting information that requires computer processing, like the amount, from the rest of the image and displaying it so that an operator can capture it for DP purposes. The information could then be transmitted to the bank's computer centre.

The system should also be able to sort images. In the case of images of cheques drawn on accounts at branches belonging to the same bank, sorting would include sorting into branch order. The images would then be

transmitted to the appropriate branches.

Images of cheques drawn on branches of other banks would be outsourced and could be transmitted to the Bancr networks of the banks involved, if such networks existed.

In this way Bancr would be a viable and more acceptable alternative to the Electronic Funds Transfer System, EFTS, concept where cheques are totally eliminated, because Bancr dramatically reduces the amount of cheque handling, while enabling the customer to continue using his cheque book.

Banks in the UK see the biggest

benefit of Bancr being the elimination of the need to sort actual cheques and transport them physically to the branches they are drawn on in order that the signatures on them can be verified.

Some of the benefits of Bancr anticipated by the Bank of America include reduced energy and fuel consumption, reduced paper consumption and the increased ability to handle rising cheque volumes without sacrificing speed, accuracy or control. Bancr would reduce or greatly alleviate the problems caused by individual cheques being mislaid.

The Bancr development effort within NCR is concentrated at the company's special systems development centre at Torrey Pines, near San Diego in California. Problems being tackled there include extracting information from "picture" cheques, where the decorative picture can be confused with the relevant information on the cheque.

## Castell's new venture offers scheme to assist young growth companies

YOUNG, growing firms in the information technology field can now turn to a new company, Castell Computer & Systems Telecommunications Ltd, of Witham, Essex which has been started with the ambition of trying to help new technology-based firms.

Established by Dr Stephen Castell, a long time campaigner for the provision of venture and development capital for new technology-based firms, the new company is acting on behalf of a

He explains his scheme by pointing out that, "This type of private company, particularly that in the computer services industry, frequently finds itself frozen out of the conventional sources of equity and loan finance or, if it manages to find

CASTELL can be contacted on 0821 851776

accommodation it is often on only severely disadvantageous terms to the, typically, founding and still-managing technological entrepreneur owners. Paradoxically, such a company can often show spectacular growth rates with the right sort of development finance backing."

The new scheme, he claims, will overcome some of the "classical difficulties" associated with financing small, new-technology private companies by "floating" a proportion (usually between 20% and 49%) of existing or new shares, or a mixture, on the new Over The Counter "Exchange" Market into the hands of a wide spread of individual investors. Castell emphasises that this will be carried out by his clients who are very experienced in these matters, with the utmost caution and attention to the regulations governing the issue of such securities.

"The Offer Document will be particularly clear and comprehensive and have something like 'Danger—You Are Entering a High-Risk Investment Area. Widows and Orphans with Life-Savings Keep Well Away' printed clearly on its cover!" he commented.

The subsequent responsibilities of the "floated" company will be kept to a minimum. It is fundamental to the scheme that the existing management will be left largely alone to get on with the job of attaining the performance set for their company made possible by the new finance, although obviously a



CASTELL... "overcoming some of the classical difficulties."

company of licensed securities dealers in offering a scheme to assist young growth companies.

Dr Castell, who worked for international merchant bankers, Bremer Holdings until earlier this month, told Computer Weekly that the kind of growth company he is looking for, typically has a turnover of between £150,000 and about £500,000 and is currently operating at break-even but has signs of rapid growth to annual turnover and profits of about £5 million and £500,000 within two to three years.

Capital in tranches of between £50,000 and £500,000 is available, according to Castell, and a company's shares may be valued on the basis of about two to three times projected earnings.

## Guardian OS extended

A SUBSTANTIAL extension to the Guardian operating system allowing Tandem 16 NonStop computer systems to be linked in distributed networks, has been announced by the company.

Called Guardian/Expand, the key feature is that the same automatic sharing of programs and applications which takes place in a local multiprocessor Tandem system can now take place in a distributed network. According to Tandem the only difference which will be observed by the user is a slower response time from remote applications than from local ones.

Tandem currently has some 240 processors installed with 80

customers worldwide, and did about £25 million of business in the year ended September 30.

In the UK, the company has received two orders from Barclays and two from the Ministry of Defence. The Barclays systems are one dual-processor handling foreign exchange dealing, and another acting as controller for a worldwide asynchronous point to point communications system connected directly to the channel of a twin IBM 370/158 system in IBM 2780 emulation mode.

One of the Ministry of Defence systems is to be used for code-breaking at Government Communications Headquarters, GCHQ, in Cheltenham.

## Exam papers contract

A CONTRACT worth £77,000 for automatic marking of 700,000 exam papers has been completed by Lowndes-Alex, the Croydon, Surrey, for the Matriculation Board of Nigeria.

The exam answer sheets, submitted by 100,000 students, each contained multiple choice answers to 100 questions. The huge task of marking them, and from the results assigning to the

students the 20,000 university places available, was given to Lowndes-Alex after the Matriculation Board had seen the bureau's advertisement in Computer Weekly.

In addition to calculating each student's mark, the computer system had to apply standardisation formulae to bring the levels of 18 different examinations into line.

## DEC announces 3271 interactive software link

AN IBM 3271 protocol emulator has been announced by DEC for the PDP-11. The software makes the PDP-11 resemble a 3271 terminal controller, with each minicomputer task acting as a terminal to the mainframe.

Programs running under RSX-11 and IAS can thus communicate interactively with programs running on a System 380 or System 370 host.

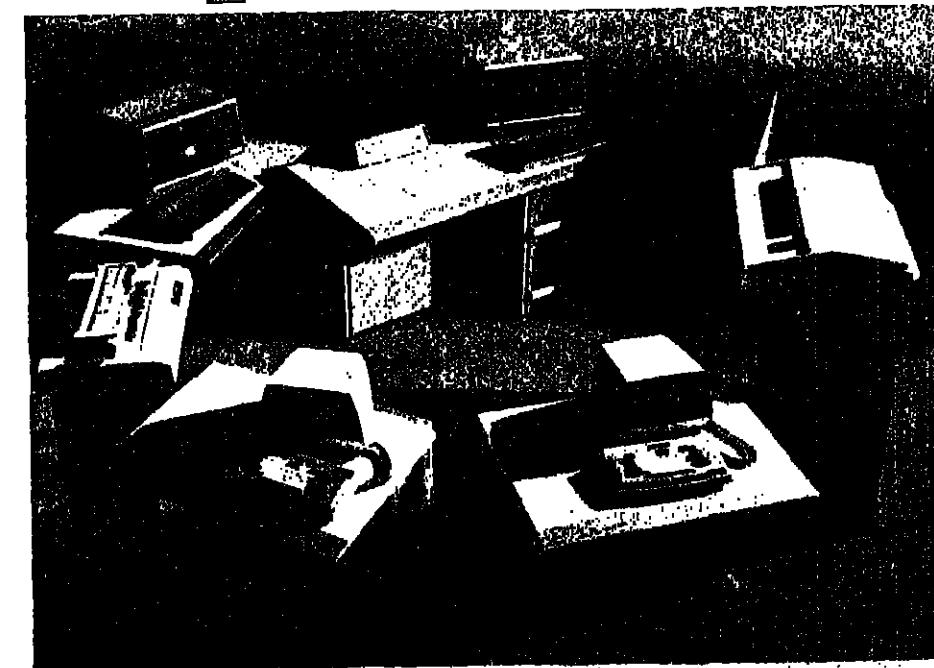
PDP-11s using the protocol can share a multi-drop line with other devices using IBM's BSC communications protocol. The other devices can include true 3271 controllers as well as other

PDP-11 emulators. Priced at £3,050 with full documentation and support, the package can also be purchased unsupported for £2,025. Multiple-sale licence-only price is £1,215.

### Ulster rights

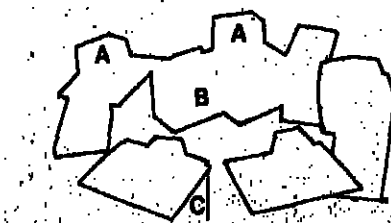
HAVING gained no satisfactory agreement with Queens University, Belfast, over negotiating rights for its 350 members there, of whom 60 are computer staff, ASTMS has passed the dispute to the Labour Relations Agency, the Ulster equivalent of ACAS.

# GMC SOVEREIGN here, now, for power and performance



## GMC SOVEREIGN with MPK

A. PROCESSING TERMINALS - these operate independently because of their (32Kb minimum) micro-processors. Each can be used for supervisory functions, as a communications controller, or for the support of line or serial printers. Additionally users can create and run



B. DISK/TAPE PROCESSOR - dedicated to ensuring optimum use of disk/tape channels. It responds to, and quickly services, disk commands from all other processors in the system. Disk capacity can be increased to 100Kb for on-line storage of data batches, system files, entry and validation (formats and user programs).

C. DATA ENTRY KEYSTATION PROCESSORS - there can be four of these, each supporting eight (520 character) Keystations on one system.

GMC Data Preparation Distributed Processing Business Systems

Head Office and Manufacturing: Maxwell Close, Hemel Hempstead, Herts HP2 7AA. Telephone 0462 441055.

Handwritten signature or note in the bottom right corner.

## Peripheral Hardware Ltd

**TELETYPE**  
43 KSR  
£869  
also ASR and RO Models

**LEAR SIEGLER**  
ADM - 3A  
£595  
also ADM - 1A, 2, 2B

**digital**  
LA38  
£849  
also LS 120, LX 180, VT52

**DRILLIC Lamanna**  
3000  
£895  
add ASR to your KSR 30 cps punch reader

**LEAR SIEGLER 200**  
£1685  
Heavy duty 180 cps printer

**SCI**  
£739  
prints VDU screen in 1 second. 2200 cps rotary printer

IMMEDIATE DELIVERY

QUANTITY DISCOUNTS

Link House, Pool Close, West Molesey, Surrey Telephone: 01-941 4806 Telex: 922175

**GNT 36 Tape Punch**

- NEW DESIGN
- 0-50 CH/SEC
- 5-8 CH
- Basic Unit or Systems
- OEM DISCOUNTS

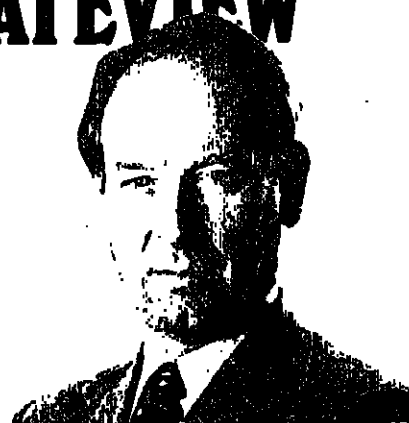
£250-10ff

GNT Automatic (UK) Ltd  
Windsor House,  
1 Albert Street, Slough  
Telephone: Slough 212987



# MICHIE'S PRIVATEVIEW

Where the  
genius of  
calculating lies



THE one thing that a calculating prodigy is not particularly good at is calculating. Yet in a very precise and well documented sense, that is the fact of the matter.

There is a general truth about the nature of highly trained intellectual skill, which seems a little obvious once it is stated, namely that if you are obliged to operate on problems with a computer made of jelly, you are likely to develop rather strange computational strategies.

Facts such as the one cited above seem to administer a jolt nonetheless. People forever slip back into the assumption that the brain's raw bit-handling capacities, in the case at least of sufficiently gifted and trained practitioners, are the equal of at least an 80 mips Cray-1 machine. I call this the "van Dusen delusion", after the hero-detective of the early French thrillers of Jacques Futrelle.

Reviewing one of these (in "Bloody Murder") Julian Symonds tells us the following:

"He (Professor Augustus S. F. X. Van Dusen) is introduced to us when he refers contemptuously to chess, saying that a thorough knowledge of the rules of logic is all that is necessary to become a master at the game, and that he could take a few hours of competent instruction and defeat a man who has devoted his life to it. A game is arranged between the Professor and the world champion, Tschalkowsky. After a morning spent with an American chess master in learning the moves, the Professor plays the game. At the fifth move Tschalkowsky stops smiling, and after the fourteenth, when Van Dusen says 'Mate in fifteen moves, the world champion exclaims: 'Mon Dieu! (he is not one of those Russians who knows no language but his own), and adds: 'You are not a man; you are a brain — a machine — a thinking machine'."

To calculate a mate in fifteen knowing nothing but the moves would occupy the Cray-1 for something like 10<sup>30</sup> years of continuous running. The age of the solar system is but a flash by comparison, a mere 10<sup>10</sup> years or so, so that it is hard not to feel sympathy with Tschalkowsky. Had he known more physics Tschalkowsky would have realised that the great detective's performance was not just superhuman but actually supernatural, since limitations to do with the speed of light and the atomic dimensions of matter decree that NO machine could ever perform the feat which he had witnessed, not even a "thinking machine".

Although the van Dusen delusion is at its more rampant in the matter of processing power, the onlooker tends to endow the expert's brain with equally impossible properties also of store. Just as lightning calculating prodigies do not calculate any faster than you or me, and chess-masters do not analyse numbers of moves in the forward tree of possibil-

ities, so the professional memory men electrify large audiences without in fact having any better or worse raw memory than the next man. Somehow the audience convinces itself that the performer is actually storing and addressing each atomic item, just as though he had some vast 10<sup>10</sup> bit RAM inside his skull.

Larry Lorraine in his "How to develop a super-power memory" opines that anyone can acquire the same gift just by working hard enough to study his mnemonic rules, or any similar mnemonics. Such rules centre round the systematic formation of associations for pairwise linking of concepts, coupled with the use of imagined sequences of events, ie stories. This latter was regularly exploited by ancient Greek orators for learning a speech.

The textbooks on rhetoric advised reading through the speech while perambulating accustomed terrain, one's house and courtyard for example. Each time the speech was conned, the same journey would be made, until each sentence was tagged by association with a familiar spot.

When finally launched on the speech the orator needs only imagine himself sauntering over the route, and as in his mind's eye he passes each familiar sight, the corresponding passage of text is triggered from memory.

Ridiculous, weird, obscene, violent and generally far-out images make the best associations. Suppose that my private mnemonic code for the first ten numbers is "Nought is for sport; one is a bun; two is a shoe; three is a tree; four is a door; five is a hive; six is Weetabix; seven is Heaven; eight is a date; nine is for wine", and someone speaks fairly slowly the following number to me with the idea that I should later recall it: "803, 735, 204, 381, 682". The memory-man's approach is to put together a rapid mental scenario as the digits are spoken, something like this, say: "I have a date with an all-in Wrestler but she gets up into a tree thinking to make it to heaven, but falls out of the tree onto a bee-hive getting stung so that she breaks the high-jump record through the door of a passing plane which crashes on the tree so I have my date again and start with a bun for the two of us with Weetabix and wine which she pours into her shoe drowning the bees so all end happy."

The fact that the extemporised story is violent, childish, bad-taste, grotesque and otherwise embarrassing will prove to be its strength if some weeks from now a reader should suddenly say "What was that fifteen-digit number?" "Would it have been 803, 735, 204, 381, 682?" I will reply innocently, as my in-

eye follows that muscle-bound lady through her appalling antics.

To mention a few tricks of the trade is only to graze superficially the deeply worked territory of the memory men. But the principle is not in doubt. Their amazing achievements, just as those of a Grandmaster in remembering chess games of his own and others, are not attributable to the Creator's having handed them some special piece of hardware. *Prima facie* tests of a Grandmaster's power to recall briefly-glanced chess positions seem, it is true, to indicate possession of special equipment. But try randomly permuting the pieces on the board before the brief glimpse. Robbed of the meaningful associations with which, for him, a chess position overflows, the gift promptly deserts him.

So too with calculating prodigies, of whom the greatest was probably the late Professor Alexander Aitken, the Edinburgh mathematician. In his published study of Aitken, Professor Ian Hunter remarks that

"A number is apprehended (by Aitken) as a multiplicity of numerical attributes and, so to speak, as bristling with signalling properties. This simultaneous, immediate apprehending of numerical attributes is often autonomous in that no specific preparation is necessary. For example, on one occasion the thinker heard the year 1961 mentioned, and apprehended this as 37 times 53, and 44 squared plus 5 squared, and 40 squared plus 19 squared."

This power to apprehend attributes in a flash, reminiscent of a Grandmaster's glimpse of a chess position, was the basis of what Hunter called the "First phase". Aitken's response to a problem was divided into two phases. During the first he was occupied in rummaging through his well stocked pattern-memory for components with which to synthesise a calculative plan. During phase 2, or "run time" as we might say, he was executing the plan by doing the specified calculations in sequence. But the sequence proceeded, as measured by the rate at which he uttered successive digits of the solution, at roughly the same speed at which anyone else would have performed it.

So calculation itself is not where the calculating prodigy's genius lies. Program synthesis, not the matter, is the heart of the matter.

Reference: Hunter, I.M.L. (1982) An exceptional talent for calculative thinking. *Brit. J. Psychol.* 85, 243-258.

Donald R. Kline

## SOFTWARE FILE-1

# BP buys package for Jackson method

A COBOL pre-processor which supports the Michael Jackson structured programming method has come into the limelight with the sale of the package to BP. And Michael Jackson Systems is preparing to market the software more actively.

JSP-Cobol generates a Cobol procedure division directly from Michael Jackson's design language. It was installed by BP late last year on trial at its Harlow site, and has now been bought for use on its Univac computers.

A spokesman for Michael Jackson Systems said the package had been in existence for about two years. It had seven or eight users, the longest standing being International Stores.

With one exception, the software left the first three divisions of a Cobol program unchanged, he said. However, the procedure division was radically different; pre-processor input here consisted of a list of operations together with design language specifications of the processing structures.

The pre-processor, he said, should not be regarded as a way of generating Cobol more quickly. Rather the input should be treated as a higher level language in its own right. Maintenance, for example, should be performed on the design language, not on the Cobol.

"If people are going to mess around with the generated Cobol, then they have failed to understand the Michael Jackson design method," the spokesman observed.

He added that the package automatically performed a number of optimisations, particularly those concerned with saving space. For example, where several SELECT operations shared the same end-action, the software would generate a common action-tail, branched to with GOTOs.

Mostly written in JSP-Cobol itself, the package includes procedures in assembler. It is thus fully portable, being available currently for Univac 1100, and IBM VS, OS, and DOS systems. A version for ICL 2903/4 systems is expected to be available later this year.

## SOFTWARE FILE -2

# Chance to find out what APL can provide

"THE simplest, most effective, and most enjoyable way to find out what APL can offer" is how the APL User Group describes a meeting to be held in London this Friday, November 10. Due to speak is Al Rose, one of the world's foremost exponents of the language.

Rose, one of the founders of the Scientific Timesharing Corp, will give his one-day "Introduction to APL" in the Read Lecture Theatre at Imperial College.

The same venue has been

chosen for an afternoon presentation just one week later by Ian Sharp, head of the other major APL timesharing company, I. P. Sharp Associates. Sharp will speak on November 17 on APL, communications, and the development of APL over the next ten years.

Those wishing to attend on either day should contact Peter Cytax at ICL Datakit (Reading RG6 3B9) or Mike Goodall at Ciba-Geigy (Horsham S0101). The UK APL User Group is a specialist group of the British Computer Society.

## PROGRAMMER NOTES

# Shortage of expertise threat to growth of electronics

"PROGRAMMING is a craft, more akin to weaving baskets and carving ivory statues than to assembly-line labour."

These are the colourful analogies used by an American electronics expert while addressing the Electronic Industries Association of Japan in Tokyo last month.

Earle Jones, of SRI International (formerly Stanford Research Institute), was seeking to explain that shortage of software expertise could limit the growth of electronics in the 1980s more than any other single factor.

His statement on programming is neatly echoed in the opening sections of a recently published book, "Studies for Programmers", which is squarely aimed at developing "craftsmen" programmers.

Essentially a collection of programming exercises, it is intended primarily as a source book for programming course instructors.

The problems, which are sizeable, are placed by the author in the context of the classic apprenticeship. "They are suitable," he says, "as training projects for the novice programmer who wishes to become first a journeyman and then a master."

He disclaims, however, any attempt to teach specific programming techniques, data structures, or languages. The book also avoids discussing any particular programming style or structured programming method.

Of the 28 problems presented, many arise from the two areas of games and computer science, and although only two full solutions are given, a bibliography is provided which will often suggest an approach.

An original idea, it has been turned into a clear, inviting, and informative text by its author, who teaches at the David campus of the University of California. It will be found both enjoyable and instructive by anyone keen to extend their programming skills.

"Studies for Programmers, by Charles Wetherell, pp.200, published by Prentice-Hall, £9.95.

## Correction

A TYPOGRAPHICAL error occurred at a key point in Jon Kerbridge's article on microcode (Software Techniques, CW, October 28). The second paragraph on p.34 should have begun with the sentence: "In the same way that a program is a sequence of instructions, a micro-program is a sequence of micro-instructions."

# Why Ellerman replaced proprietary TP monitor after two years

THE deficiencies of ICL's online systems philosophy are cited by Ellerman Lines, the shipping firm, as the immediate reason for its decision to replace a proprietary TP monitor just two years after first installing it.

At the heart of the problem is the roll-in/roll-out mechanism advocated by the company for use under MTS on its small 2904 mainframes.

Ellerman Lines two years ago bought two 2904s, which serve three remote sites through a 7502 controller. At the same time it bought Zeus Hermes Cortez TP monitor, to support anticipated high-volume TP applications.

However, with four such programs implemented, the company found that the query response time varied unpredictably when batch work was running, rising on occasion to as much as a minute. This was attributed to the roll-on/roll-out overhead.

The only way to achieve a predictable response time was to lock the inquiry programs in store. With a total of eight inquiry programs projected, this approach was ruled out because of the cost of buying the extra store required.

Instead, the firm decided to adopt a single program approach, using overlays, while at the same time installing Telecomputing's TPS. A major factor was the performance

improvement possible using a multi-threading TP monitor.

"Having decided to change our approach, and taking into account our projected workload, performance was the critical factor," said a spokesman. "We wanted to put out TPS on the most efficient basis possible."

"We found Cortez an excellent environment for developing TP applications. The version we have, however, is not multi-threading and I don't regard the enhanced software, Cortez-Plus, as a true multi-threading monitor either."

"It is actually a multi-leaving system, permitting tasks to be interrupted. Moreover, these facilities have to be built into the application, and are not handled automatically by the monitor."

The spokesman explained

that another factor in the decision to convert to TPS was Ellerman Lines' need to install an online program development system. Telecomputing's new active Operator (Software, CW, October 13, 1977) could do this to TPS with only a slight additional overhead.

A spokesman for Zeus Hermes regretted that his company had not been able to examine the projected TP workload. "One question is whether the plans are feasible under a TP system."

"Assuming that they are, there are many approaches to improving system performance, for example tuning the message router. I am sure we could have sorted out the problems given the chance."

# Councils to use US vehicle fleet management system

A US-developed vehicle fleet management system has been acquired by the Local Government Operational Research Unit, LGORU, for future use by local authorities in the UK. The software may also be sold to other ICL mainframe users.

Called Fleet Management Package, the software serves the needs of transport and workshop managers for information on vehicle life, repairs, fuel consumption, and preventative maintenance.

It was developed by Public

Technology Inc, one of LGORU's partners in the International Urban Technology Exchange Program.

LGORU acquired UK and European marketing rights to the software after investigation revealed that no similar package was currently available. It has entered an agreement with ICL for sales to ICL users.

First user of the system will be Northumberland County Council, which will implement the existing IBM version.

# VARIAN PRINTER/PLOTTERS

Varian is the value-for-money printer/plotter that's suitable for all popular paper widths — with a wide field of application from computer listing, through C.A.D. to structural design.

Hardware and software costs are lower than most others on the market.

And with Varian's high reliability, servicing is minimal. At Euro we have many years' in-depth printer/plotter experience. Take our advice — for economy you can trust, choose Varian.

## ASK ABOUT THE NEW 9000 SERIES

Thanks to proven electronics and advanced mechanical design, the Varian 9000 Series delivers consistently superior graphics with minimum operator attention.

**EURO**  
instruments

- \* Low purchase price
- \* Negligible servicing
- \* Low operating costs

Euro, sole U.K. distributor for one of the world's finest technical products, has the highest standards in professional service, problem solving, calibration, fast servicing and on-time delivery. Call Euro with confidence.

## QUALIFIED TO HELP YOU QUICKLY

Euro Electronic Instruments Ltd, Shirley House, 27 Camden Road, London NW4 1YE. Tel: 01-267 2748 and 01-267 6410. Telex: 23920. Also at: 32 Broom Hill, Woking, Surrey, GU24 0PU. Tel: 0484 5577. Telex: 51621.

# ADABAS

(The adaptable data base management system)

AN ADABAS SEMINAR  
WILL BE HELD IN LONDON  
ON NOVEMBER 30

PROGRAMME  
Introduction to the package  
On-Line demonstration  
User experience

Find out more by returning the coupon below or telephoning 0332 372635

ADABAS SOFTWARE LIMITED  
LAURIE HOUSE  
22 COLYEAR STREET, DERBY

NAME  
TITLE  
COMPANY  
ADDRESS

Send me details of the ADABAS Seminar



**robotron**

Robotron Export-Import  
Foreign Trade Enterprise of the German Democratic Republic  
DDR-108 Berlin  
Friedrichstrasse 6

For further information:  
Data Office Equipment (U.K.) Limited,  
Laird International House,  
Old Station Road,  
Loughton, Essex.  
Telephone: 01-502 0115 (5 lines)

**data**  
Business Systems  
**1720**

Low cost, high performance, fully integrated office computer system with visible records.

- \* Processes orders
- \* Prepares sales invoices
- \* Up-dates stock records
- \* Up-dates sales ledger accounts
- \* Summarizes outstanding debtors
- \* Up-dates purchase ledger accounts
- \* Prepares cheque and credit transfer payments
- \* Calculates and prepares payroll and pay slips
- \* Provides comprehensive end up to date management information.

For more details please ask for an information leaflet.

- Specification
- \* Automatic front feed or magnetic card reading unit
  - \* Single or double continuous stationery device
  - \* 100 b.p.s. mosaic needle printer
  - \* Up to 2048 alpha-numeric data stores (RAM)
  - \* Powerful application program (PROM)
  - \* Illuminated operators control panel

Appl. 1720



## OP SPOT

# A package for program function keys under DOS

PROGRAM function keys, which often save IBM OS/VS operators much unnecessary typing (Op Spot, CW August 17), may be used to similar effect in the DOS and DOS/VS environments.

The software package which makes this possible is called Logout and is available from Macro 4, a software house in Wallington, Surrey.

This piece of information will be of particular interest to the shift leader who contacted me a while back to discuss PFKs in relation to his system, an IBM 370/138, under DOS/VS, Release 34.

In a letter to Op Spot Keith Piper, a programmer at Macro 4, explains:

"Logout operates with any standard, unmodified, DOS/VS supervisor and does not entail



Piper

renaming or changing job control, attention routine or any other IBM supplied component."

With Logout the keys are defined at IPL, or load, time and may not be modified online.

Continues Piper, "Logout will display the text associated with each key but, quite deliberately, does not allow the text to be altered. After some discussion, we decided that setting the values at IPL time gave the flexibility needed, without the risk of accidental alteration."

Each key may be assigned up to 30 characters and the text modified before submission.

Says Piper, "The text may represent a complete input message or just a prefix to a message. Since Logout PFK support operates by adding the text to the beginning of any input typed by the operator, the concepts are identical." He gives the following explanation:

"The user includes these

specifications:  
"...PF6='D RDR',PF12=MSG F2,...."

"Now to enter D RDR, FREE (a commonly used POWER/VS command) the operator types FREE and hits PF6."

"The attention routine displays 'D RDR, FREE' and processes the command as required. To enter 'MSG F2', he simply hits PF12."

Other features include: Timestamping each message on the log (in a Virtual Machine environment the CPU-ID is included).

Message suppression, which writes unwanted messages to the hardcopy file, but omits them from the log itself.

Time limiting, and progress reporting.

Reprint and analysis programs for the hardcopy file.

Specify Texas Instruments 810 Printer for your customers, and you're specifying greatly-increased throughput. It comes from the 810's bi-directional printing which minimises printhead travel time. Printing is at 150cps, with transmission speed selectable up to 9600 baud.

Other features are programmable forms length, vertical/horizontal tabs and six clear copies. Options include full ASCII character set, compressed character printing, forms length selection, vertical forms control, current loop or other industry compatible interfaces and foreign character sets.

To support this throughput the 810 has an ultra-reliable printhead with a life expectancy of around 150 million characters.

## Price Right, Too

Good news on the 810's price. It's now down to £1650.00 (+ VAT)\* and, 50-off, just £1056.00 (+ VAT)\*.

When your customers ask for a cut in the cost of printer ownership, answer them with the 810.

Contact us at Bedford or any of the numbers below. We get it Right.

## TEXAS INSTRUMENTS LIMITED

European Digital Systems Division, MS33A, Manton Lane, Bedford, England, MK41 7PA.  
Tel: 0234 67466 Telex: 82178.

Stockport, Tel: 061 442 8448 Slough, Tel: 0753 35545

# The 810, end of throughput bottlenecks

OMni 800  
electronic data terminals

\*U.K. Domestic Prices only, subject to change without notice

By Bernard Allen

## HINT OF THE WEEK

### Check all job control cards yourself

BEFORE feeding a large batch job (in terms of the number of data cards submitted) into the card reader, scan the deck for any errors in job control syntax. In this way it might be possible to prevent the job being flushed by the system as the result of an error.

Now some might contend that it is the responsibility of the job control section to check the cards in this manner but, to me, that is a

weak argument.

Firstly, a lot of time is wasted in sending the job back to the control section for correction.

Secondly, the unfortunate operator will have to re-read the job to the system, anyway.

Thirdly, by examining the decks in this manner the operator will become adept in spotting errors and will add to his expertise.

## Queueing listfiles on same printer

THE George 3 operating system will sometimes offer a number of alternative solutions to an operations problem, providing staff are willing to make use of its facilities and employ their own technical expertise.

I say this after considering some comments from Geoff Westcott, a programmer and former senior operator. He writes to Op Spot in response to a letter from Roy Cosway, senior systems programmer at the Truro site of Cornwall County Council (Op Spot, CW October 12).

Cosway called for better communication between operations and programming, and gave an example of what this can achieve. He described a situation in which George 3 intends to print payslips on two printers, simultaneously, but the operators want only one unit to be used for that purpose.

He went on to explain how the system programmers, once they knew about the problem, were able to make a small change to the operating system and save the operators a lot of typing at the console.

Now Westcott feels that altering the operating system is "rather complicated" and puts

forward an alternative solution. "When I was an operator I had a PROPERTY ONELP, which was set as PERMANENT, INCLUSIVE. He gives the coding:

- 1) PR ONELP (PERM, INCL)
- 2) AU 14, PRONELP

According to Westcott, PROPERTY may be used good effect when it is necessary to list more than one file: special stationery, using just a printer. He gives an example: Job Description:

- 1) LF PAY1, \*LP, PAY1 & ONELP
- 2) LF PAY2, \*LP, PAY2 & ONELP

Says Westcott, "This is only one of the possibilities. PROPERTY attributes both listfiles will be queued to the same printer and no request to load payslips issued."

Pointing to the reason specifying INCLUSIVE, he continues, "Listfile comes which do not request this PROPERTY may also make use the printer to which it attributed."

## Where do I go from here?

IN the absence of established career paths for operations people, more and more staff are becoming aware of the need to use their own initiative to secure positions where they can make use of their hard-won skills.

In this regard a senior operator from Staffordshire writes, "I have five years' operations experience in a large real time environment. I am looking to further my career but do not want to move out of operations."

Apparently he has seen an advertisement for an operations analyst, and asks, "Do you have any information about this kind of position? The only requirement specified was that the applicant needs to have a strong personality."

Well, such positions exist, but certain enlightened organisations are aware of the experience and technical expertise that operations staff have to offer.

Now most support roles for a thorough understanding of hardware or software exist. In this instance the need for "strong personality" is specified which implies that operations work will involve investigating errors and dealing directly with users.

But without knowing the site concerned, the advice I can give is this: go for an interview and find out exactly what the work is all about. If you feel the job is for you, look elsewhere.

## Shift Supervisors

... are required to be decisive, effective communicators and organisers, and good leaders.

Infotech Operations trains Shift Supervisors

Call Jenny Woodhams for details 0628 35051

Infotech Operations Ltd.  
Nicholson House, Maidenhead, Berkshire, England  
Telephone: Maidenhead (0628) 35051 Telex: 247319

COMPUTER ROOM.  
PLEASE ENTER VIA YOUR  
OWN TERMINAL.

As a DP manager, you're probably more aware than most of the great computer paradox.

On the one hand, your system is designed to cope with vast quantities of work, and to save people time.

But on the other hand, there's you. Overworked. And spending so much time updating and modifying old programs, you've hardly any time for innovation.

Which is precisely why IBM developed the System/38.

It's a computer that starts with half a megabyte of memory, and can handle up to 40 local work stations plus many more remote clusters.

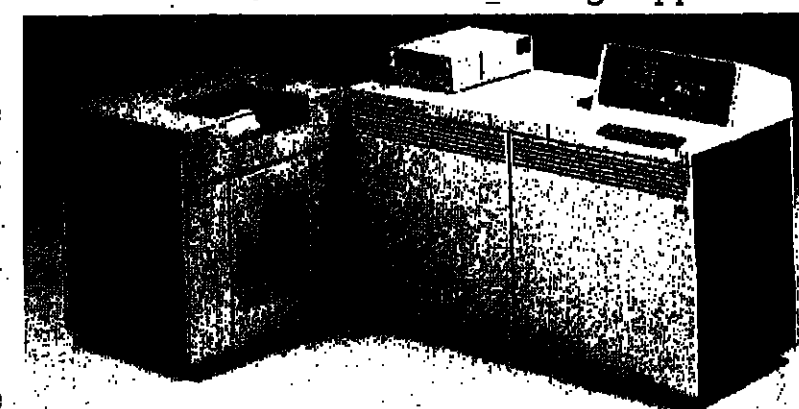
All configurations offer the same remarkably sophisticated user facilities - those you'd expect only on very large systems.

Yet, incredibly, the price starts at around £72,000.

The System/38 works with a new system of 'super software' which considerably reduces the programmers' unproductive time.

And it's fast, thanks to the new single-level storage which dynamically holds high-activity data and program pages in the processor.

You can equip all your key departments with their own VDUs, because the virtual storage approach



THE NEW SYSTEM/38. HIGH PERFORMANCE. EXTRAORDINARY VALUE.

removes the usual restrictions on the size and number of multi-tasking programs.

Interactive program development and 'on-line debugging' mean faster, more productive programming.

By building logical files from one pool of company data, the relational data base can supply information in the most useful form for every user.

Its extensive in-built security

features help each department keep its own data secure, yet allow them to recall it in any form whenever it's required.

System/38 is so simple to use that everyone with any responsibility can be trained to use it.

In fact, it can help inexperienced users with prompts.

And if that's good news for the other key people in your company, it must be the scoop of the year for you.

Now you and your staff can get on with the more interesting jobs that really demand your specialist knowledge.

To learn more, fill in the coupon or call your IBM representative.

For every minute you spend looking into the new System/38, you could save hours once it's installed.

Name \_\_\_\_\_  
Address \_\_\_\_\_  
Company \_\_\_\_\_  
Position \_\_\_\_\_ Tel. No. \_\_\_\_\_  
Alan Butcher  
General Systems Division  
IBM United Kingdom Limited  
28 The Quadrant  
Richmond, Surrey TW9 1DW  
Telephone 01-840 8545



Purchase price of £71,688 for 618K byte memory, 30-megabyte disk storage, 650-ppm printer and 4 VDUs. Control software licensed at £275/month.



**cole**  
AN RMC GROUP COMPANY

Cole Electronics Limited,  
Dist Products Division,  
105-107 Lansdowne Road,  
Croydon CR0 2BN,  
Telephone: 01-880 8807  
Telex: 924847

*High Sales Office:*  
Dublin, 001 880888







## RELATIONAL DATABASES

Part 3

## How fourth normal form files can be constructed

THIS week we will define fourth normal form files and show how they can be constructed.

**Relational Files.** In conventional file design, one value of the key field (or fields) uniquely identifies one record. In files designed using relational database principles, each file has a key (or keys) which correspond to the more precise definitions given in Part 2. The following rules apply to such files:

- Each key data item (or concatenation of data items) in a file has either an n-to-1 or a 1-to-1 relationship with every non-key data item in that file.
  - Each non-key data item in a file depends upon (each) key item. If a key is a concatenated key, each data item not within that key depends upon the whole key and not just part of the key.
  - Each non-key data item in a file is not related to any other non-key data item in that file.
  - If a key is a concatenated key, each item within the key participates in an indirect relationship. The meaning of an indirect relationship is discussed later in this series.
- Note again that a file may have more than one key and such keys may be concatenated keys. These rules can be summarised succinctly (if not entirely accurately) by the following aphorism: "Each non-key data item depends upon the key, the whole key, and nothing but the key."

Corollaries of the four rules are that in each file:

1. There are no repeating groups.
2. Each non-key data item depends upon the key or keys. If the key is a concatenated key, the non-key data item depends upon the entire key but not on any part of the key; no part of such a key is redundant. This is called "full" dependence and the key is called a "full" key. If there is more than one concatenated key, each item within each key depends fully upon each other key.
3. No data item depends upon a key via another (non-key) data item.
4. No data item which is part of a concatenated key is unrelated to any of the remaining data items in that key.

**Normal Forms.** A file which satisfies corollary 1 is said to be in first normal form. A file which satisfies corollaries 1 and 2 is said to be in second normal form. A file which satisfies corollaries 1, 2 and 3 is said to be in third normal form. A file which satisfies corollaries 1, 2, 3 and 4 is said to be in fourth normal form.

Note that files in any of the normal forms may have only one record type.

**Direct and indirect keys.** A non-key data item which satisfies corollary 3 is said to be directly dependent upon the key, and the key is said to be a direct key for that data item.

A data item which depends upon a key via one or more intermediary data items is said to be indirectly dependent upon the key, and the key is called an indirect key for that data item.

Example: In the relationship diagram in Part 2, ORDER-NO is a direct key for CUSTOMER and an indirect key (via CUSTOMER) for SALESMAN.

**Candidate keys.** If a data item C depends upon a data item A and also upon another data item B (and if A and B are related), A and B are said to be candidate keys for C. Note that A and B do not merely form a concatenated key for C; either A or B alone is a key for C. A and B are in a 1-to-1 relationship.

Example: If Figure 1, Part 1, had an ITEM-CODE field as well as ITEM and ITEM-CODE would be unique to a particular ITEM, both ITEM and ITEM-CODE would be candidate keys for DESCRIPTION.

Performance considerations apart, fourth normal form (FN4) files represent an ideal file structure, and the notion of candidate keys leads to a precise definition for such files. Since there may



By Max Stewart

This is the third in a 10-part tutorial series on databases and structured file design, by Max Stewart, the divisional technical support manager for Leyland Vehicles, the commercial vehicle division of BL.

now be some confusion between the term "key" and "the key of a file", let us redefine the meanings of candidate key and FN4 file as follows:

- A candidate key is a key (possibly a concatenated key) which is a direct full key for every other data item in a file. Each key value uniquely identifies a record within the file.
- A file is in fourth normal form if it has no repeating groups, if every direct full key is a candidate key, and if every concatenated candidate key contains an indirect relationship which includes all members of the key.

**Creation of FN4 files.** The process now to be described can be used to create FN4 files from a collection of data items after drawing the relationship diagram. Remember that in a relationship diagram a key is either on the "n" (arrowed) side of an n-to-1 relationship or on one side of a 1-to-1 relationship.

Step 1. Select a data item which is a key (for data items which together form a concatenated key select all of them). The selected key (which may be a concatenation of data items) is called the prime key (strictly the prime candidate key). If two or more data items (or concatenations of items) are candidate keys, arbitrarily select one as the prime key. The remainder are called non-prime keys.

Step 2. Select those other data items which depend directly and fully upon the prime key. This includes any non-prime candidate keys. If a non-key data item depends upon the key data item in more than one relationship (eg if in Figure 1, Part 1, there were two types of salesman — a "perishables" salesman and a "non-perishables" salesman — and a customer were allocated one salesman of each type), both data items can be considered to be available for selection as many times as there are relationships.

Step 3. Construct a file which has the prime key as key field and has the selected dependent data items as non-key fields.

Repeat these steps for each key (or concatenated key) which has not already been selected as a prime or non-prime key. Note that if an item is selected as part of a concatenated key, it is still available for selection later in its own right or as part of a different concatenated key.

After these steps have been completed, there may still be unselected data items. These can either be unrelated to any other item (in which case they form a file of their own — really just a list of values); or in an n-to-n relationship with one or more other data items. The following step should be applied to each pair of such data items in which each item in the pair is unrelated to any other unselected data item apart from its partner (ie is in the simple type of n-to-n relationship which was introduced in Part 2). More complex n-to-n relationships can exist but are unusual.

Step 4. For each simple n-to-n pair, construct a file with the pair as concatenated key and with no other data items in the file.

Finally, examine each file in turn and delete records which are duplicated within any one file.

These steps look formidable in cold print but are simpler to perform than to explain. Remember that most of the time we are just picking out keys and clustering each key together with its dependent data items into a simple file.

Part 4 will include a demonstration of this process and will discuss some of the advantages of FN4 files.

79



## Role of the Microform Specialist Group

THE Microform Specialist Group, MSG, is a somewhat hybrid organisation supported by specialists from the computer and microfilm fields.

Some years ago the introduction of computer output microfilm caught the attention of a number of BCS members who felt that the potential of this new technology justified the type of closer study which a BCS Specialist Group makes possible.

In the first year of its life the MSG spent much of its time in the mutual education of

more complex issues such as "holographic storage as microfilm". The output of computer data on to microforms (fiche and film) and the entry of data from microfilm (CIM), are highly active areas in which the MSG sees scope for more very worthwhile work. The new microprocessor devices, the quest for an alterable film to compete with VDU (avoiding wet processing) — these and many other questions beckon us.

BCS 79's theme, "Living with Computers" fits naturally into the MSG activities. At this event, on the morning of Friday, January 5, an educational and challenging programme will be offered to the group. There will be three presentations chaired by Ron Fiddes, of the UK Central Computer Agency. The first, by John Spencer, of Shell UK Ltd, will be set the scene by covering the history and development of Computer Output Microfilm. This will be followed by Malcolm Innes (Maticom) talk on the future of COM as he sees it. The second presentation is designed especially for the software enthusiast and will be led by

David Terry of the UK Central Computer Agency, supported by Barry Ashdown (of London Ajax) dealing with basic computer software for office "dumb" COM devices. Richard Taylor (of Datagraphy European Division) will describe minicomputer software for offline "intelligent" COM devices and Keith Barton (of NCR) will take a new look at the whole COM software scene.

In each of the presentations time will be allowed for delegates' questions.



Ron Fiddes, chairman of the BCS Microform Specialist Group.

microfilm and computer technologists and then set out to provide basic introductory talks to the public through seminars.

This basic approach to its activities has continued, though nowadays early questions such as "How does dazzo film work" have given way to

## Prime developments

COMMUNICATIONS software for the Agricultural Research Council's Honeywell 716 front-end processors at Rothamsted.

The Computer Department at Rothamsted will use Com Pascal and Prime Pascal Assembler on the £25,000 user Prime system in use associated with its participation in EPSS and its plans to use as well as new facilities for leased line and dial-up users.

ARC institutes to Rothamsted ICL 4-70 and 4-72 mainframes. The Computer Department at Rothamsted will use Com Pascal and Prime Pascal Assembler on the £25,000 user Prime system in use associated with its participation in EPSS and its plans to use as well as new facilities for leased line and dial-up users.

These steps look formidable in cold print but are simpler to perform than to explain. Remember that most of the time we are just picking out keys and clustering each key together with its dependent data items into a simple file.

Part 4 will include a demonstration of this process and will discuss some of the advantages of FN4 files.

## Managers and unions come to grips with the automated secretary

AN important aspect of word processing is that it affects a goodly number of ordinary workers — secretaries and typists — directly, while data processing has largely been done behind closed doors by specialists staff. So the human problems involved in introducing it can be formidable, and this was confirmed by the number of people, more than 90, at Information Studies' conference in London last week on "Word Processing — the Human Dimension."

On the platform were several well-known pioneers in the introduction of word processing, who came to describe their experiences and give their advice.



DORIS LENSION, consultant: For God's sake let's get the 3 Rs right at school first, before teaching about word processing.

Frank Jones from Bradford City Council claimed to have saved £59,000 a year and cut typing staff from 44 to 22 with his Wordplex 7 system.

An added attraction was Barrie Sherman of ASTMS, there to give a "trade union perspective."

"The unions don't have a view on word processing yet (because up to this year the TUC didn't know a silicon chip from a chip but) but this doesn't excuse you from not having a view on the unions," he said.

Things will start to happen soon, Sherman asserted, especially after next April's TUC conference on microelectronics, and as productivity is increased by word processors, more and more unions will be saying "We want a share."

(This led Logica's Pat Coen to remark with a grin that he was happy to take orders now from people wanting to get their systems in before next April.)

Sherman claimed that union penetration in the clerical area of the private sector, as yet very weak, would soon be growing to catch up with the public sector, and with government action on industrial democracy, this would bring about plenty of

union control over the introduction of word processing. He was also scathing of the Prime Minister's notion that the service industries could absorb the unemployment caused by automation in manufacturing.

The principal product of the service industries is information, Sherman pointed out, and office automation would bring about plenty of unemployment there. "There is no way," he said, "that a Birmingham typist can become a health worker in Wigan."

Management was one of the key issues at the conference — particularly the way in which typing services are organised. Shirley Pickard from ICI Plastics, and Irene Harford from Massey-Ferguson, both described how their firms had got rid of large numbers of individual managers' secretaries and grouped them into "bureaux" of six or so each, sharing typing and other secretarial duties between them.

Many managers were reluctant to give up their "office wives," and central facilities had to be set up to handle such peripheral jobs as tea-making that the secretaries hitherto had carried out.

Word processing screens were then installed in the secretarial bureaux, with generally good results. It was agreed by the speakers that word processors were not cost-effective when provided to individual secretaries, however attractive the machines might be, because that would entail expensive capital equipment lying idle much of the time. It could be useful, however, to give them to managing directors' secretaries, in order to convince the MD of the value of the concept.

Pat Coen, as both supplier and user of WP, emphasised the advantages of shared logic systems with regard to centralised management. Shared logic places under the direct control of the supervisor all purging of files, making of security copies, linking to other systems and other input media such as OCR, and so on. This, he claimed, contributes greatly to productivity. However, he added, changing the organisational structure at the same time as introducing WP could lead to trouble, as people could only adapt themselves so much at a time.

One cri de coeur that came from all the women on the panel was over the falling standards of spelling and grammar of the typists now coming to them from school.

Doris Lenson, who at the Automobile Association was a pioneer of WP and is now an independent consultant, described how she set up typing courses and daily spelling and grammar tests at the AA in order to fight this problem.

Asked about the need for

word processing training at colleges, Lenson replied, "For God's sake let's get the 3 Rs right first."

There was much discussion — and disagreement — at the conference on the design of WP equipment regarding ease of use: the way cursors should move on a screen, and so forth. Tom Stewart, ergonomist from Loughborough University, emphasised the importance of adjustability of screens and keyboards, and the tricky problem of eyestrain.

Gordon Ross, from the Department of Industry's Work Research Unit, raised the issue that introduction of word processing could cause problems with career development structures. He also suggested that work rotation could increase satisfaction, in operating printers and the like.



BARRIE SHERMAN, of ASTMS: Up to this year, the TUC didn't know a silicon chip from a chip but, but soon things will start to happen.



IRENE HARFORD, of Massey-Ferguson: Getting rid of the "office wife" means finding someone else to make the tea.



PAT COEN, of Logica: Trying to introduce word processing at the same time as organisational changes is a recipe for trouble.

## 'Pay more to conventional typist'

ONE issue which arose at the conference as a result of Barrie Sherman's remark that "We want a share" was that of pay rates for word processing operators.

While the unions claim that higher productivity should mean that the typists are paid more, it was pointed out that typing with a WP needs less skill than with a typewriter, because no matter how many mistakes are made, or how serious they are, they can all be corrected quickly.

Thus a bad typist can still produce usable work on a WP when his or her productivity on a typewriter

might be unacceptably low. Therefore a conventional typist should get more money.

An example was quoted of an author in a London company which had recently installed WP on a large scale. This manager was annoyed about the new system because, he said, his typing was now coming back riddled with errors which he was supposed to correct, wasting a great deal of his time. He claimed that the firm had decided the WP system allowed them to employ far less competent typists than before.

This is not giving word processing a good name.



## Atlantic also leases used computers.

Atlantic maintain a comprehensive portfolio of second-user IBM computers and peripherals which can be supplied ex-stock at reasonable prices.

FLEXLEASE® leasing terms can be provided on all of this equipment.

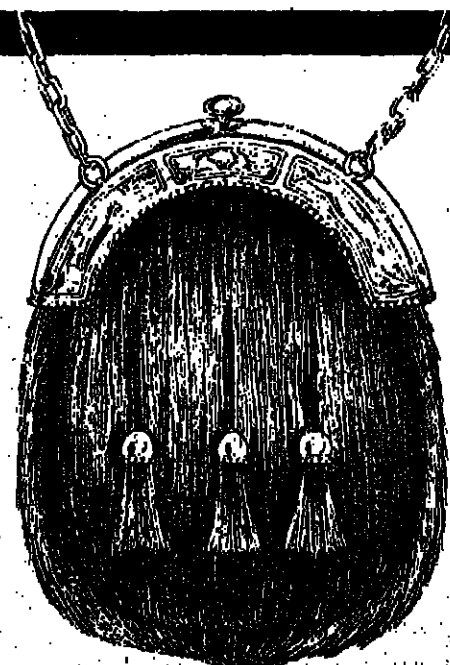
All the equipment comes complete with a valid

certificate of qualification for an IBM Maintenance Agreement (MAQ) and can be inspected prior to ordering.

**ATLANTIC**  
Atlantic Computer Leasing Ltd  
27 Chancery Lane London WC2  
Tel: 01-405 8238 Telex: 268344



## Sperry Univac has finally replaced the sporran.



The Scots have always had a reputation for looking after their money. Sporrans were once considered the best place to keep cash.

They're still as canny north of the border but now they've found a safer depository, because Clydesdale Bank together with Sperry Univac have implemented the largest computer system of its kind operated by any UK or US clearing bank.

Just sixteen Sperry Univac V77s and 1500 counter terminals will handle the bank's day to day business quickly and securely.

And they could do the same for you. V77s may be small but their capacity for hard work isn't.

They offer Data Base Management, Transaction Processing, Distributed Processing plus a degree of communication flexibility so far unexcelled by any competitive system.

So, if you want to find a safe way to look after your business, and your bank balance, learn more about the Sperry Univac V77 series. Call the Marketing Director on 01-961 2110. Or drop him a line at Sperry Univac Centre, London NW10 8LS.

**SPERRY UNIVAC**  
COMPUTER SYSTEMS  
SPERRY UNIVAC IS A DIVISION OF SPERRY GORDON



# IPC bureau's view of an upgrade to a 2900

LIKE any ICL user, Computer Data Processing Ltd, the company which operates primarily as an in-house bureau for the International Publishing Corporation, is faced with the problem of where to go from its twin System 4/72 mainframes.

Plans are to move to DME System 3 on 2900 as an interim step to VME/B. Initially the 2900 will be run under DME for two shifts, switching to development under VME/B for the prime shift, so that one System 4 can go next summer. Later, the other System 4 is likely to be replaced by a larger 2900.

One System 4 is on long lease from ICL, and the other on long lease from a finance company. With ICL no longer offering this kind of lease, the new machines will be third-party financed.

Some preliminary work towards the changeover has already been done.

"We sent a group of operators

to Dalkeith with what we regarded as a typical one-shift DME workload to run benchmarks on a 2900, and the results were encouraging," Ted Piper, managing director of CDP, told Computer Weekly. "The 2900 processor is less powerful than the 4/72, but the loss on computer-bound jobs is largely outweighed by the significantly faster input-output. However, under VME/B the comparison is less good because, for example, there is much more communications overhead under VME/B than under System 4 J." He also mentioned I/O error correction under VME/B which takes up two to three times as many processor cycles as it does under J.

Piper had a word of warning for users lulled into a sense of false security about the ease of transferring workloads from native machines to DME.

"It is only true to say that no

modifications to programs are required if you transfer to a machine with an identical configuration to your System 4. But if you want to take advantage of things like denser discs, which any user is likely to want, then some conversion is involved.

"It also appears that any programs written under an earlier release than J1800 have to be recompiled before they will run under DME.

"We have just about completed the task of identifying the system which will represent the half of our System 4 workload which we transfer to the 2900, but we have not yet calculated the effort which will be required to do the conversion. For example, there may be tape-based systems which we want to convert to discs."

Nevertheless the advantages of DME are underlined by a further assessment made at CDP.

"Even if we had decided to go IBM in, say, five years' time, it would almost certainly have been cheaper in the interim to go for DME on 2900 rather than another System 4."

"But I think you have to make the commitment to go to the native mode of the machine you are using. I hear 1900 users saying that they plan to use DME on 2900 indefinitely, but at some stage they will come up against the problem that there is nobody left with sufficient 1900 expertise to amend those programs.

"It is even more vital for System 4 users, since there are fewer of us. In perhaps three to five years' time, expertise in System 4 JCL and Usercode will have largely died out, and no one will want to learn it afresh to solve our problems. You must have a target date for running entirely in the native mode of the machine."

## LETTERS TO THE EDITOR

### Voting rights in the BCS

IN a recent issue (CW, October 19), Mr David Allan, the secretary of the Kingston Branch of the BCS, is quoted as saying that "We want full membership with voting rights for such experienced staff, not merely affiliate status as at present." As a branch officer, he is surely aware that the only members of the Society who do not have voting rights are students and persons more than four months in arrears with subscriptions. Perhaps Mr Allan is confusing voting rights with eligibility for election to Council, which is restricted to Members and Fellows.

Neither is there an exam, as Mr Allan suggests, for persons seeking admission to the professional grades, the Society demands proof of competence at appropriate levels. Having passed examination in relevant subjects is one way of proof of such competence, but not the only one.

BCS London

### Market share of graphics business

AN item (CW, October 28) raises an interesting mathematical (not to mention marketing) problem. In it you state that the combined operations of Benson and the graphics division of Varian, which Benson has just acquired, are "about half the size of Calcomp's graphics division."

You preface this by saying that Benson has "won 50% of the European market for graphics peripherals" and then go on to say that their turnover last year was about \$10 million, worldwide.

When one considers that, according to their recently published report and accounts, Calcomp's turnover in Europe

alone was more than twice that of Benson's, which \$18 million of graphics production is difficult to work out, can give Benson a 28% share.

Admittedly, \$18 is something a little less than \$18 million, but while Benson's like CIL, Kongsberg, Houston Gerber, etc. name a few?

According to that, they didn't do much last year.

Woking, Surrey

If you think you have found the most cost effective key-to-disc system from the world's leading supplier, and it's not from Inforex, well...

Think again! About cost effectiveness: from Inforex you can get a complete three key-station system for under £10,000. Think delivery again: you could do away with punched cards by the end of the month. Think about service: a reliable, well proven range backed by a national service team. Any way you think about it, Inforex offers the best available solution. The world's leading supplier, with over 4,500 systems worldwide, will take you from punched cards to key-to-disc (expandable to meet your most exacting requirements), to data management and to distributed processing with a compatible product range and the support to make it happen. Telephone Inforex at 01-863 8311, or send the coupon for full details to: Inforex Limited, Inforex House, Headstone Road, Harrow HA1 1PL.

**INFOREX**  
Data Management Systems

think again!

Please send me further information on Inforex key-to-disc

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

### Nixdorf speeds accounts at TV studios

UPDATING from a semi-manual accounting system to an online system, London Weekend Television has installed a Nixdorf 8870 to replace the NCR 33 ledger card accounting machines previously used.

The 8870, chosen in preference to an outside bureau service, will enable LWT's accounts department to handle over 3,000 purchase invoices and about 2,000 journal entries a month.

Special software has been written to manage payments to artists for work on productions in the LWT studios.

The LWT system consists of a model N 8870 processor, five VDUs, and 30 Mbytes of disc storage. Another 30 Mbytes of disc will be added later, and it operates under Nixdorf's Comet accounting package.

### Recognition fight

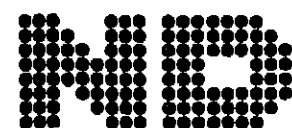
A ONE-DAY stoppage was called at British Aerospace's Chester computer centre last Friday by members of APEX who are seeking recognition from the company (CW, November 2). The other established union there, TASS, has said that it will not interfere in the APEX claim, which refers to staff at BAC's Kingston site and those seconded to Chester from there, unless APEX attempts to gain recognition among all staff at Chester.

### Datacoms study

NEARLY 4,000 firms in Europe will soon be contacted to determine their level of data communications usage, for the Eurodata 78 study commissioned earlier this year from Logica (CW, March 9).

### NORD systems have built-in growth potential

Choose a flexible system for your future.



NORD - for a flexible future

Richard Norton (NORD) Ltd, NORD House, 17 Belfo Street, London N1. Tel.: 01-2785501, telex: 299 537

## APL - a complete service

Datasolve APL is a service which gives you all the power of an interactive programming language plus the benefits of fast response, rapid program development and immediate results.

What you get is a service which is easy to learn, easy to use and provides a full range of utilities and packages such as our Financial Planning System (FPS), Simulation, Network Analysis,

Graph Plotting and Statistics, for example, compatible, fully supported and integrated. Datasolve's APL service is available on a network using both high and low speed links. We also provide complete documentation.

For more information contact:  
APL Unit,  
BOC Datasolve Limited,  
Datasolve House,  
59 Church Street, Staines,  
Middlesex TW15 4XS,  
or telephone Staines 61644.

Please send me more information about:

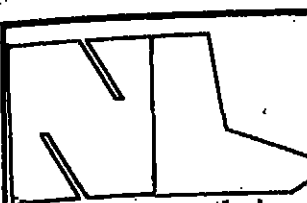
☐ Financial Planning (FPS) ☐ Simulation ☐ Network Analysis

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

**BOC Datasolve**



### NEWBURY SMART MICRO-BASED VISUAL DISPLAY TERMINALS



Model 7008-7009

- \* British design and manufacture
- \* Based on 8080A Micro-processor
- \* Two-page Memory 3,840 Characters
- \* 24 Displayed Lines of 80 Characters per line
- \* Switchable Transmission Speeds from 50 Baud to 19,200 Baud
- \* Split Speed Transmission Mode
- \* Dual Interface—CCITT V24 and 20/80 mA Current Loop
- \* Hard Copy Printer Output
- \* Protected Field Format—Blink—Background or Half Brightness
- \* XY Cursor Address (send and receive)
- \* Roll or Page Mode
- \* Video Output for External Monitors
- \* Full Character Editing Features
- \* Block Transmission from Screen by Line or Page
- \* Green Phosphor Non-glare screen



Models 7001-7002

- \* 24 Lines of 80 Characters per line
- \* Selectable Baud Rates from 50 to 19,200 Baud
- \* Dual Interface—CCITT V24 and 20/80 mA Current Loop
- \* Teletype Compatible
- \* Hard Copy Printer Output
- \* Selectable Half or Full Duplex
- \* Video Output for External Monitors
- \* Green Phosphor Non-glare Screen



Model 7000

- \* Teletype Compatible
- \* 24 Lines of 80 Characters per line
- \* Selectable Baud Rates from 50 to 19,200 Baud
- \* CCITT V24 Interface
- \* Selectable Half or Full Duplex
- \* Green Phosphor Non-glare screen

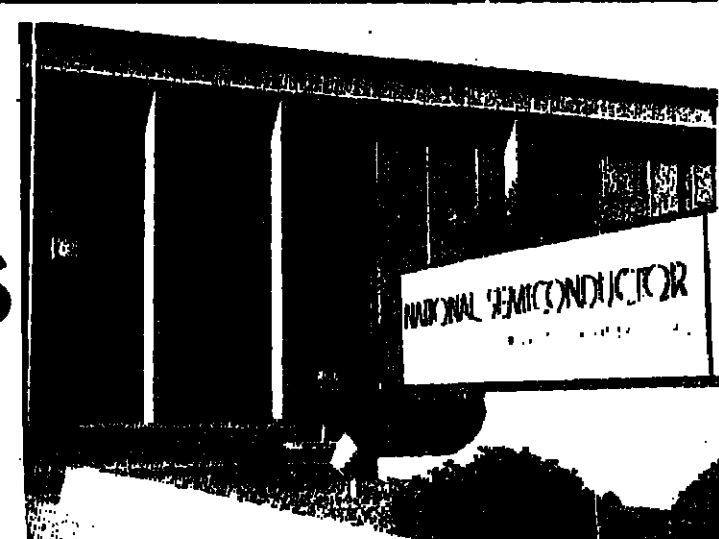
PRICES FROM £495

Newbury Laboratories Ltd.  
King Street, Odham  
Hampshire RG25 1NN  
Tel. 025 871 2910  
Telex: 858815

## MICRO NEWS VISITS NATIONAL SEMICONDUCTOR IN CALIFORNIA

These days the microprocessor means more than just the "chip", now so much in vogue in the national Press. The semiconductor companies know that the fundamental key to the marketplace is not just technological development with hardware, but also considerable strength in software. In common with other manufacturers, National Semiconductor is pushing both aspects with equal vigour.

Howard Raphael, National's microprocessor marketing director, spoke to Micro News editor MARTIN BANKS at the company's world headquarters in Santa Clara, California, about its planned developments in the 16-bit processor market, and in high level language support — in particular, the support of Pascal.



World headquarters of National Semiconductor in Santa Clara, soon to become another base for the support of Pascal as an important high level language for 16-bit microprocessors.

## Now National opts for Pascal, the people's language

PASCAL, already christened by some in the US as the "people's language" seems set to become a real force in the world of complex microprocessors over the next two years. During this time, the new ranges of 16-bit devices will start coming on to the market in volume, and another major manufacturer entering the fray, National Semiconductor, is gearing itself to support the language.

The device on which it will run has yet, officially, to receive a designation, but according to Howard Raphael, microprocessor marketing director with National, the company is committing itself to the support of the language on a 16-bit micro that will be broadly similar both to Zilog's Z8000 and Motorola's 68000 devices.

The company is pursuing developments on both the 16-bit and 8-bit front, making use of its X MOS process. This, like the HMOS now being used by Intel, uses a scaling process to reduce component geometries. This makes use of the photolithographic techniques that are a fundamental part of semiconductor manufacturing at present, photographically reducing the physical size of the chips produced.

Raphael was keen to point out that National's development efforts were predominantly geared to producing what he referred to as "third generation" devices, both in the 16-bit and 8-bit arenas. Though he would say little about the 8-bit development work, beyond the fact that some announcement "was a possibility", he was more willing to talk about the company's plans in the third generation 16-bit marketplace.

The X MOS-processed device has already been scheduled for a launch during the first half of 1979, and will have several characteristics in common with the other complex 16-bit processors that have launch dates coming up.

It will, for example, be able to address a significant amount of memory directly, though Raphael would not be drawn on how much, and it will feature 32 bit characteristics. Again Raphael would not be drawn, but this seems to be a reference to 32-bit memory addressing, while functioning on 16-bit data.

The overall concept of the device was set out by Raphael in these words: "The third generation microprocessors should be a combination of current computer architecture and the advances that are possible through technological development. Where necessary, they should also include some of these characteristics already developed for 8-bit devices."

He suggested that National's entry into the fray would produce a device with between 10 and 20 times the performance of currently available 8-bit microprocessors.

National seems to be following a line between the Intel

approach to the 16-bit market with its 8086 part, and Zilog, with the Z8000. The National device, according to Raphael, will require a limited number of new peripheral devices. In particular, there will be a requirement for a memory management device.

Thus far the company tracks the route being trod by Zilog. The new part will, however, still be dependent to a considerable degree on the peripheral chips already available for National's second source 8080 micro-processor, "to protect", as Raphael puts it, "our investment in these products."

This is an area where National is already heavily committed. Though it is only a second source supplier of the Intel pro-

Previous objections to high level languages on microcomputers have centred around the fact that they are code inefficient and have little in the way of a real-time capability. The new 16-bit devices, when they are on the market, will help to change this situation.

processor chip, it now claims to have a larger selection of peripheral devices available for use with the part than Intel. In general terms, Raphael now divides the micro market into distinct sectors. These start with what he defines as the very low end, which covers the low cost microcontroller area where devices sell in the \$1 to \$3 price range. This is followed by the low end market, which he defines as being those systems with less than 4K of memory, a strong I/O orientation, and a chip count of less than six devices.

The biggest single market area Raphael calls the mid-range. Taking about 50% of the total microprocessor systems market, this is given over to the 8080, Z80 and 6800 family of processors, usually with between 8 and 12K bytes of memory.

The final two sectors, which are by no means the largest, but of growing interest to National, are the high end market, and the bit slice market. The former, which Raphael says covers applications requiring large memory systems, is of obvious interest with the forthcoming introduction of its own new 16-bit part.

The slice market, where National both second-sources the AMD 2900 family and produces its own versions of the part, is small: it is, however, growing at about 20% a year at present, and is showing no signs of falling off, despite the

imminent arrival of the new 16-bit devices. It is, according to Raphael, an area where National has done well, especially with its high speed version of the 2901 processor using the company's Schottky Coupled Logic, SCL, process. This, a similar design process to ECL, is used in the arithmetic logic unit of the processor to provide a higher processing speed.

Two new versions of the device, due to be launched by National late this year, will make use of this process. One, the 2903A, is categorised by Raphael as being a "very high speed processor". The other part is designated the 2910A, which he terms as being "very, very high speed".

Back to the subject of Pascal, Raphael confirmed other opinions that the movement towards the language is growing strongly, even though there is,

as yet, no real standardisation beyond the popularity of the San Diego Pascal.

He points to several reasons why the Pascal "movement" is gaining pace. One is directly geared to coming of the more powerful microprocessors. "Previous objections to high level languages on microcomputers have centred around the fact that they are code inefficient, and have little in the way of a real time capability," he said. "The new 16-bit devices, when they are on the market, will help to change this situation."

Another important reason for the move to Pascal, according to Raphael, is the ease of adaptation for people who have already learned to program in Basic.

Its other advantage, of course, is that it does offer a real time capability.

This move by National does not mean, however, that the

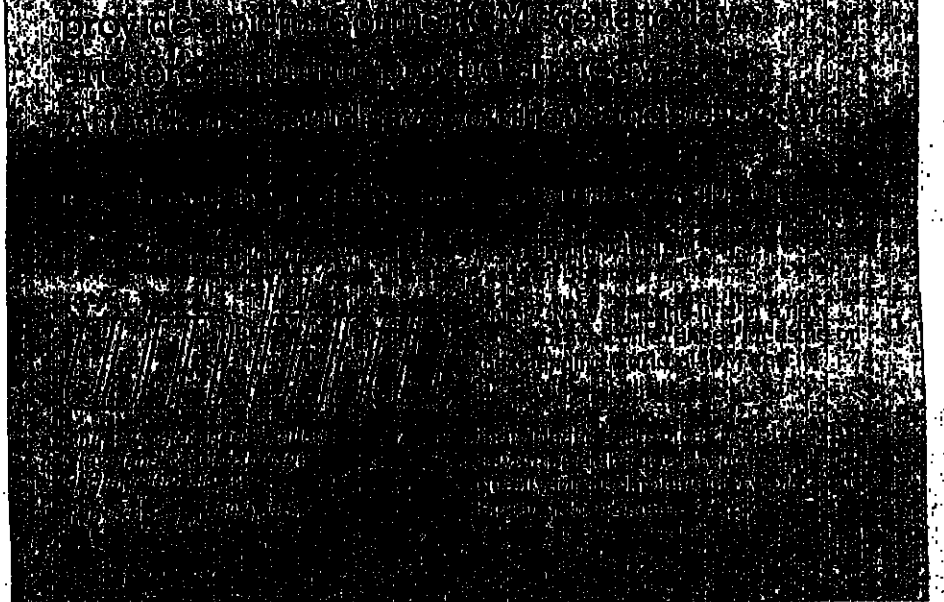
company will be diminishing its current software support operations with Basic and Fortran.

With Basic, for example, the company is currently gearing up to launch a version of its 84K ROM that will hold the Micro-soft 8K byte Basic interpreter as firmware. This will complement National's existing offering in the firmware market, a 32K ROM holding National's own, 4K byte simple Basic, called NIBL.

This combination of developments in firmware modules, and increasing efforts in software support constitute a concerted attack by National on the cost of software generation. With Pascal, the company is pushing a frontal attack, trying to make high level languages more efficient, and with the firmware modules, it is moving towards the development of firmware applications packages.

## IBM. The alternatives...

A conference to examine the alternatives to IBM's PDP-11 and other minicomputers.



Please send me full details on IBM: The Plug Compatible Marketplace

Name \_\_\_\_\_ Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Country \_\_\_\_\_ Telephone \_\_\_\_\_



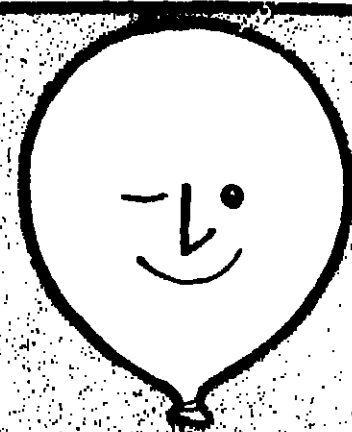
# Appointments

CHRIS PRIER  
01-236 1800

LONDON  
01-236 1800

MANCHESTER/GLASGOW  
061-872 4211

BIRMINGHAM/BRISTOL  
021-356 4838



RATES  
£10 per  
column  
SERIES  
7-50  
13-50  
26-50  
52-50

Our circulation is the highest in the industry at a cost per thousand 25% lower than the nearest competitor.

## EMS CONTRACTORS

URGENT — Phone today

£170-£250 p.w.



### SOUTHERN

Honeywell COBOL PROGS, London & H. Counties.  
ICL COBOL/PLAN, London, City & H. Counties.  
Hewlett Packard ASSEMBLER Progs — Surrey.  
Honeywell to ICL Conversion Progs — Harrow.  
Mini Progs, Message Switching — Herts.  
Mini Analysts & Progs Real Time Compilers — Herts.  
IBM OS/MVS COBOL/ASSEMBLER, Sussex/Surrey.  
IBM/ICL COBOL — Norwich.

### MIDLANDS

Honeywell IDS Cobol Stock Control.  
IBM-IMS Analysts & Programmers.  
Hewlett Packard ASSEMBLER — Worcs & W. Midlands.  
ICL COBOL Progs — N. Midlands.  
FORTRAN Programmers — Midlands.

### NORTH

Honeywell COBOL — N.W.  
Honeywell COBOL — Hull.  
Honeywell COBOL — North East.  
IBM COBOL/DL1 — Doncaster.  
FORTRAN Programmer — N.W.

E.M.S. Consultants Ltd.  
61-63 Lower Street  
Newcastle  
Staffordshire

Tel. 0782 623665  
(10 lines)  
Selina Mills, John Wood

E.M.S. Data Centre  
Tricorn House  
51-53 Hagley Road  
Edgbaston  
Birmingham  
Tel. 021-454 7908  
Don Philip  
Damien Handallip

## NEW CAREER OPPORTUNITIES NEW HONEYWELL LEVEL 62/40 HARDWARE NEW ON-LINE SYSTEMS DEVELOPMENT SYSTEMS ANALYSTS/SENIOR PROGRAMMERS LEICESTERSHIRE

SALARY c£6,000

Our client, highly profitable and successful International Manufacturing Organisation, are market leaders in their particular field. Substantial plans to develop a wide range of new systems based on the installation of a Honeywell level 62/40 mainframe in an on-line environment. This has created three exciting new opportunities within an interesting and fast moving environment with above average prospects.

### SYSTEMS ANALYSTS

Ideally, candidates should have:

- \* a minimum of 2 years' systems analysis experience
- \* successfully implemented at least one major project
- \* ideally, a degree or professional qualification
- \* the ability to lead project teams from initiation to project completion

### SENIOR PROGRAMMERS

Ideally, candidates should have:

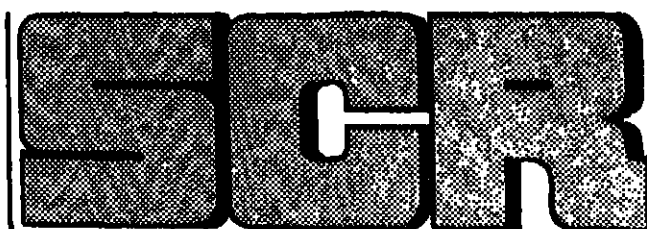
- \* a sound commercial COBOL programming background
- \* ideally, some experience of on-line systems
- \* ideally, a formal qualification

Not only will you gain invaluable experience, but prospects for career development within this developing environment are exceptional. Terms and conditions of employment are excellent and interested candidates should contact, without delay:

CATHY TRACEY ON. 021-236 3781 (24 hour answering service)  
OR 021-454 3351 (evenings & weekends)

REF NO. C/11/1

## SPECIALIST COMPUTER RECRUITMENT LIMITED



BIRMINGHAM 021-236 3781  
Freepost, Equity and Law House,  
35-37 Great Charles Street Queensway, Birmingham B1 1AB  
MANCHESTER 061-833 0427  
Freepost, Blackfriars House, The Paragon, Manchester M2 1BB  
LONDON 01-935 0471  
Freepost 53, 3 Mandeville Place,  
Wigmore Street, London W1M 6LB



## COMPUTER SYSTEMS DEVELOPMENT

We are a large mail order company located in the North West of England. Plans for the next five years involve an increasing reliance upon computer solutions.

We require a man with solid systems experience. Likely candidates will be not less than 30 years of age and currently earning in the region of £6,000 per annum.

Promotion for the right man can be rapid and selection will be based on the criteria of strong Management and technical know-how, and the ability to negotiate and motivate.

A realistic salary and excellent benefits are negotiable.

Please send comprehensive details to:

J. Nelligan, Director  
JOHN MYERS AND CO. LIMITED  
Trafford Road, Eccles, Manchester  
M30 0JF



## Computer Engineers

First we fly you  
to the States  
for training  
then you take off  
with a great  
new product  
Honeywell

As an experienced Computer Engineer you'll already know about Honeywell's new concept in computer printing PPS... the first total printing system, non impact, ten times faster than conventional printers.

PPS is a system in its own right. Built around a Honeywell Level 6 minicomputer. Operating off line it can accept output from ICL, IBM, Univac, Burroughs as well as our own mainframe computers.

It's the sort of major breakthrough Computer Engineers dream about getting their hands on. We're offering that opportunity to a few select Computer Engineers. It's the chance to become a Customer Engineer in tandem with our top sales people and be a vital link in the technical presentation of a revolutionary new product — you will have been educated to OGC/HNC or equivalent, with at least three years in minicomputers and an above average electromechanical aptitude. We'll supply you with the specialist technical know-how by sending you to Phoenix on a training course.

An attractive salary is offered, together with a company car and a full range of benefits. No doubt about it, PPS, plus your own initiative and drive will quickly place you among the elite in the customer engineer market.

Please telephone or write to Garick Fraser, Honeywell Information Systems Limited, Honeywell House, Great West Road, Brentford, Middx. Telephone 01-898 8191 ext. 382.

## MESSAGE SWITCHING

LONDON — HOME COUNTIES & EEC  
£6-9K (N.K.) £10-15K (EEC)

If message switching is your forte and you value working at the cutting edge of developments in the switching field such as System-2 then we have our clients' authority to bid for various positions with a view to offering you what can only be described as a superlative career opportunity involving advanced applications in an environment featuring freedom coupled with significant autonomy. These opportunities suitably suit experienced applicants (2-5 years). Our client specifically requires Senior Analysts, Analysts, Programmers, Systems Designers and Programmers at various levels of seniority. The principal programming languages are Assembler, COBOL, Pascal, etc. If your hard-earned background includes PDP, NOVA, Philips, Intel, Prime, etc. you will be at the top of the shortlist. Write off for an early interview telephone details as soon as possible.



Telephone: 01-491 4436 (10 Lines)  
360 Oxford St. London W1N 9RA

## FURTHER APPOINTMENTS APPEAR ON

PAGES 33, 34, 35,  
36, 37, 38, 39, 40,  
41, 42, 43, 44, 45,  
46, 47, 48, 49, 50,  
51, 52, 53, 54, 55,  
56, 57, 58, 59, 60,  
61, 62, 63.

## New ICL 2970 Installation Operations

One of London's largest Boroughs is in the process of installing an ICL 2970, 2 megabyte computer. Vacancies now exist for Operations/Control staff to join our team. We run a two shift system, five people per shift. Each shift will be responsible for On-line Operations and Data Control.

### Senior Operators

Ref. C/8/8762 to £5130 inc. S/A

With at least three years' experience on a large multi-programming machine, one year of which has been in a supervisory position. Duties will include: training, working to pre-determined schedules, diagnosing hardware and software faults, liaising with engineering and user personnel and being fully conversant with On-line Operations.

### Senior Controllers

Ref. C/8/8763 to £5130 inc. S/A

With suitable experience of Data Control in a large machine environment, preferably including On-line Operating. Duties will include: being responsible for controlling all input data associated with processing, assembling and debatching data in accordance with pre-determined schedules, liaising with users, training all staff under him/her and being fully conversant with On-line Operations.

### Operator/Controllers

Ref. C/8/8764 up to £4150 inc. S/A

With at least one year's experience in a large multi-programming environment, either on Data Control or On-line Operating. The successful applicant will carry out duties both On-line and Off-line using some of the most up-to-date equipment in a large go ahead installation. We offer the usual excellent public service conditions, including 20 days holiday, a restaurant and good sports and social facilities. If you are an ambitious person keen to develop your technical and personal skills, telephone: 01-701 2870 anything for an application form or write to: THE PERSONNEL OFFICER, London Borough of Southwark, 27 Peckham Road, London SE5 8UB, quoting reference and job title. Closing Date 16 November 1978

**Southwark**

## SENIOR SALES EXECUTIVES (Area Managers Designate)

London & S.E.

Basic c.£6,000 + car  
on quota £15,000

Our Client is a well-known American company, who have been in the U.K. for three years. Their offices are based in the London area (Twickenham) for the purpose of offering Data Processing Systems, based on Minicomputers, to Commerce and Industry.

### They supply the following:

- \* Remote Terminal Systems
- \* Distributed Processing Systems
- \* Data Collection Systems
- \* Financial Packages
- \* Transaction Processing

Due to expansion they now require Senior Sales Executives for different areas of London and the South East. The successful candidates will in time have to expand their areas and recruit new sales personnel.

In the interim you will be given a £6,000 basic, a high guarantee for one year and a realistic quota that will pay you a total package of £15,000 in your first year.

For further information please contact

TELEPHONE: 01-839 6087  
Bill Taylor  
(Evening & weekend 0990 24978).

Barnard, Davies & Ward Ltd.  
Computer Personnel Consultants  
107 Jermyn Street, London SW1

DAVIES & WARD LTD

## HIGHLAND HEALTH BOARD TREASURER'S DEPARTMENT

### ANALYST/PROGRAMMER

Salary Scale: £4,421-£5,328

Applications are invited for the above post in the Computer Services Unit which is situated in the grounds of Hilton Hospital.

The current workload encompasses a variety of financial and medical applications which is processed on an ICL 2904 computer.

Applicants should have at least two years' relevant experience and be conversant with ICL Cobol and Software.

Application forms and further particulars may be obtained from and should be returned to the Personnel Officer, Highland Health Board, Reay House, 17 Old Edinburgh Road, Inverness, IV2 3HG, not later than 24th November, 1978.

"The Trade Mark set out below was assigned on 3rd January, 1977, by The Singer Company, 30 Rockefeller Plaza, New York, U.S.A., to International Computers Limited, ICL House, Putney, London SW15 1SW, without the goodwill of the business in which it was then in use."

"MDTS" — Registered No. B1001335 — for data processing and data storage apparatus, and parts and fittings included in Class 9 for all the aforesaid goods; accounting machines and cash registers."

## International Banking International Systems Liaison

Substantial income plus low interest mortgage  
and other important benefits

London based with some European travel

Our client is one of the best known and respected International Banks. They now wish to recruit someone to assist in the development of systems, initially at two of their international sites. The position will be based in London but will require travel in Western Europe.

The job responsibility will be to assist the development of a common data processing strategy for the international offices. The successful applicant will be expected to play a major part in the development of these key projects, and offer the leadership and guidance necessary to ensure that compatible systems are established on a European basis.

The person we are looking for will either have a strong banking or accounting background. Whilst computer experience is mandatory the emphasis is on business as opposed to technical expertise. The maturity to deal with international management at varying levels is essential and therefore, knowledge of a European language, especially French, would be an asset.

Our client sees this position as one of the most important appointments they have made within their computer banking organisation for some time. Therefore, the income offered will be substantial as will the range of fringe benefits.

Please apply to John Goldsmith by sending career details and quoting reference no. 1994/CW



WE ARE ALWAYS INTERESTED IN HELPING YOU WITH YOUR CAREER  
John Goldsmith (Computer Recruitment) Ltd., 15, Buckingham Palace Road, London, S.W.1.  
Tel: 01-828 5356-24 hour answering service.

**JOHN GOLDSMITH** (Computer Recruitment) Ltd.



# TRAINING AND MANAGEMENT

## SURREY to £7,500 SYSTEMS ANALYST

GET AWAY FROM IT ALL! Work in beautiful surroundings. Our client is situated in an impressive house and seeks a systems analyst for IBM 370 and DLI. They offer the possibility of travel through Europe plus a fantastic salary including an excellent pension and social club. REF: 1889

## CITY to £5,500 IBM JUNIOR PROGRAMMER

IMPROVE YOUR CAREER! Do you find your present job dull and uninteresting? If you have around 12 months IBM DOS ASSEMBLER exp then this prestige organisation, which provides technical services to its clients, can give you the career you have been seeking. REF: 1905

## LONDON to £4,500 TRAINING ANALYST/PROG

EXCITING opportunity for programmer to be trained in one of the world's leading technological field. The company has a large IT network with links to Europe and they offer full training in database and TR. FANTASTIC prospects for PRO. REF: 1802

## W. LONDON to £8,500 SYSTEMS ANALYST

MANAGEMENT CAN BE YOURS! Have you the ability to make practical contributions to business decisions at all levels and 2/3 years IBM systems analysis experience? If so, this highly successful international group would like to discuss your future. Rapid career progression, generous benefits. REF: 1823

01-734 0152

## N. LONDON to £6,000 MINI PROGRAMMERS

WHY TRAVEL to central London? Major group of companies based close to N. Circular seek programmers with 12/18 months experience to work on real time systems on PDP11. Small project teams encourage involvement at all stages thus giving design and development a friendly atmosphere. REF: 1918

## MIDDX to £10,000 + PROFIT SHARE MANAGER

DYNAMIC person required for responsibility for and control of computer systems and hardware planning for the 8 to 10 years and the process of expansion and support staff. Applicant should have experience of 20 years and 2000 range. REF: 1907

## CITY to £6,500 PL/I PROGRAMMERS

SUPERB opportunity awaits programmer with proven track record to improve career. Programmer PL/I experience, preferably with IBM PL/I, and a major UK client - a major UK organisation. A wide range of stimulating projects exist in a commercial and financial environment. REF: 1920

## HERTS to £6,500 PROGRAMMERS

PROGRAMMERS required to work on a VAX RANGE of mini and mainframe control systems. DGT Nova hardware. Applicants should have 2 years experience of ASSEMBLER OR CORAL and/or RSX 11M would be advantageous. REF: 1908

For further details telephone our London Office 01-734 0152 (24 hours)

## CONTRACT DIVISION

### LONDON + HOME COUNTIES

SYS PROG DOS VS CICS  
IBM COBOL/ASSEMBLER DOS  
IBM COBOL OS TSO + JCL COBOL  
IBM RPGII + COBOL DOS/VS  
IMS COBOL OR ASS OS AN/PROG  
ANALYST T.P. EXP  
CORAL COMPILER PDP II EXP PREF  
TEAM LEADER BASIC COMPILER  
PDP MACRO II + CORAL PROG  
IMS PL/I DB/DC  
IBM OS PL/I  
2980 VMEB D/BASE EXP PREF  
HONEYWELL EASYCODER  
AN/PROG IBM + ICL EXP COBOL  
BURROUGHS 6700 COBOL  
AN/PROG OS COBOL  
ICL 1900 GII

CITY £270 p.w.  
HERTS £200 p.w.  
BUCKS £220 p.w.  
KENT £210 + p.w.  
E. LONDON £220 p.w.  
HERTS £230 p.w.  
HERTS £230 p.w.  
HERTS £230 p.w.  
CITY £240 p.w.  
W. COUNTRY £210 p.w.  
MIDDX £250 p.w.  
CITY £210 p.w.  
HERTS £220 p.w.  
SURREY £200 p.w.  
C. LONDON £220 p.w.  
C. LONDON £190 p.w.

### OVERSEAS

DUTCH SPEAKING PROGS  
IBM OS COBOL KN OF DUTCH  
PDP FORTRAN KN OF FRENCH  
IBM SERIES I ASSEMBLER  
PDP MACRO II RSXIIIM  
IBM OS COBOL SPSS  
IBM SYSTEMS PROGS OS/DOS  
PROGRAMMER 3790 EXP

HOLLAND £375 p.w.  
BELGIUM £375 p.w.  
BRUSSELS £375 p.w.  
HOLLAND £380 p.w.  
HOLLAND £380 p.w.  
HOLLAND £400 p.w.  
HOLLAND £375 p.w.

FOR DETAILS OF THESE AND FUTURE CONTRACTS RING  
CHRISTINE KAY OR DAVE HAYTON - 01-734 0152 (24 HOURS).  
27 NOEL STREET, W1.  
OFFICES: Amsterdam, Paris, Manchester, Birmingham

## KNIGHT PROGRAMMING SUPPORT LIMITED

27 NOEL STREET, LONDON, W.1. TELEPHONE 01-734 0152/6 (24 HOURS)  
OFFICES: AMSTERDAM, PARIS, MANCHESTER, BIRMINGHAM



Saudia, flag carrier of the Kingdom of Saudi Arabia, is seeking able and experienced staff to fill a number of challenging vacancies in its expanding Data Services Division, based in Jeddah.

## PROJECT MANAGER

Salary UK £13,300 pa - Tax free

The Project Manager will prepare the project plans, schedules and resource requirements, assist in the formulation of customer project objectives and feasibility. He will also be responsible for writing progress reports on the project and suggest recommendations accordingly.

Applicants for this key post should have a university degree or equivalent with at least six years' data processing experience including 3 years in programming and 3 years in systems analysis, and a minimum of 3 years of total experience performance with IBM 370/OS/VS 1, JCL tape disc or similar equipment systems. Previous airline experience an advantage. Dept: 120/2.

Applicants should have a university degree or equivalent with at least six years' data processing experience including 3 years in programming and 3 years in systems analysis, and a minimum of 3 years of total experience performance with IBM 370/OS/VS 1, JCL tape disc or similar equipment systems. Previous airline experience an advantage. Dept: 120/2.

## SYSTEMS ANALYSTS

Salary UK £11,200 pa - Tax free

The successful candidates will determine the feasibility of customer requests and suggest actions as well as co-ordinate with the customer to determine the scope of the requirements, data input-output calculations etc. Assist in programme coding in COBOL and train programmers in the methodology of systems design and analysis. Applicants should have a minimum of 'A' level education with

at least four years' data processing experience, of which two in programming and two in computer systems design with a minimum of 2 years with IBM 370/OS JCL tape disc or equivalent machine systems. Airline experience preferred and in particular experience with Real-time Reservations systems using I PARS. Dept: 120/3.

## SENIOR SYSTEMS PROGRAMMERS

Salary UK £11,200 pa - Tax free

Candidates for these vacancies will assist the master systems programmers with IBM Operating system generation, maintenance, analysis and installation of IBM supplied fixes (PTF) and determine correction procedures for operating system faults.

Applicants should have GCE 'A' level education with at least 4 years' data processing experience of which 2 years in systems programming on IBM 370 OS/VS 1. IMS experience an advantage. Dept: 120/4.

## COMPUTER OPERATIONS ANALYST

Salary UK £11,200 pa - Tax free

Candidates for this position will work for the operations support group and will be required to work shifts. Duties include coverage of all production systems, on the job training of junior operators and systems maintenance and

monitoring. Applicants should have GCE 'A' level education with a minimum of 4 years' experience in the operation of IBM 370 hardware, of which 2 years have been in an operations support capacity. Dept: 120/5.

These posts, which are open to men between 25-45, are offered on a two year renewable contract together with free accommodation and free and reduced rate air tickets for you and your family, 40 calendar days' vacation per annum plus relocation allowance.

Please write with full personal details quoting job title and department number to:

Area Personnel Manager - Europe,  
Saudi Arabian Airlines,  
508/510 Chiswick High Road,  
London W4 6SQ.  
Closing Date: 24th November, 1978.



**saudia**  
SAUDI ARABIAN AIRLINES  
Member of IATA

## COMPUTER OPERATOR/SENIOR COMPUTER OPERATOR

The Computer Laboratory has a vacancy for an experienced Computer Operator/Senior Computer Operator. The Laboratory provides the central computing services for the University and associated Medical School using a Control Data Cyber 72 with a wide range of peripherals and a campus network based on DEC PDP 11s. Applications are invited from those with a sound knowledge of batch, RJE and interactive systems. Salary according to age and experience on a range from £2,808 to £3,389 with an additional £231 a year two-shift allowance.

Applications (closing date 30th November, 1978) should be made to the Director, Computer Laboratory, The University, Leicester LE1 7RH, telephone number (0533) 55000 extension 42.

## COMPUTER PERSONNEL APPOINTMENTS

PROGRAMMER/ANALYST  
ASSIGNMENTS  
CIRCA £8,000  
A young person (female) in College and Non-Computers, to travel from Midlands base to sites in the North and South. Duties include specification and installation of new systems, programming and support to accounting staff. Early promotion is envisaged.

## SALES MANAGER

The company is an established leader in its field - data logging and computer peripherals. The job is based in the Cotswolds with extensive travel throughout the U.K. and occasionally overseas. Candidates should be aged from upper 30s. We are seeking an ambitious and successful sales executive with a proven record of achievement in selling computer peripherals and capable of earning in excess of £18,000 PER ANNUM. Company car and benefits. Please write with full details to: G. W. Paul, Creative Electronics Limited, Chiswick, Uxbridge Industrial Estate, Chiswick Road, Chiswick, Middx.



## SENIOR LECTURER/LECTURERS

### SCHOOL OF COMPUTING SCIENCES

The New South Wales Institute of Technology is a co-educational institution established to provide a wide range of subjects for those entering or already employed in industry, government or technological fields.

The School of Computing Sciences offers undergraduate courses in Computing Science, a Postgraduate Diploma in Data Processing, a Masters Degree by Research and Thesis, and will be offering a course work Masters Degree in 1980-81. The School has a number of laboratories including a micro computer laboratory, and a computer laboratory based on a PRIME 350. Students and staff will have access to the large Honeywell computer network, to be installed in the Computer Centre, in 1979.

The staff of the School are divided into four academic areas: Computing Systems, Information Systems, Computing Methods and Business Computing.

Computing Systems is concerned with teaching subjects including Assembly Programming, Operating Systems, Performance Evaluation and Computer Architecture. Information Systems contains many of subjects ranging from Introductory Data Processing, Commercial Programming, Data Base Management, Systems Analysis, and Data Processing Management. Business Computing provides service courses in the Faculty of Business Studies - mainly introductory Data Processing and Systems Analysis. Applications are invited for:

A Senior Lecturer is sought in the area of Information Systems. Applicants should possess a higher degree, have extensive academic or industrial experience and be able to demonstrate initiative in directing research or major projects in Computing.

Lecturers are required in the areas of Computing Systems, Information Systems, or Business Computing. Applicants should have a higher degree and teaching experience at a tertiary level or extensive industrial experience.

Salaries are in the following ranges:  
Senior Lecturer - \$420,366, \$423,737 p.a.  
Lecturer - \$415,179, \$419,840 p.a.

With consent of Council academic staff are permitted to undertake limited consulting work.

Fees and a contribution toward removal and initial accommodation expenses provided for overseas applicants. A Housing Loan Scheme is also available.

Applications close December 8, 1978. Applicants should arrange for three confidential referees to send reports to the relevant area. Applications should include address, phone number, personal particulars, documentary evidence of qualifications, work and teaching experience, publications, research work undertaken, past names and addresses of referees, contact applications and referees' reports should be sent to:

The Agent-General for N.S.W.,  
N.S.W. Government Offices,  
86 The Strand, London, WC2N 6LZ, England.

## CHIEF PROGRAMMER

West of London c. £7,500  
This is a management position, ideally suited to an experienced person able to coordinate the activities of staff, their recruitment and training. Supervisory experience and leadership qualities are essential.

## SENIOR ANALYST

West of London c. £7,000  
A substantial multi-national is seeking several Systems Analysts to join a busy team. Duties include: maintenance of hardware, software, data base, and the development of new systems. Experience of hardware or software development is essential.

## SENIOR ANALYST

N. Surrey To £10,500  
Applicants should have at least 3 years' experience in the design and development of systems. Experience of hardware or software development is essential.

## ANALYST/PROGRAMMER (RPG II)

N.W.10 £6,500 +  
You will be involved with the development and maintenance of new and existing systems. Current systems include inventory control, invoicing, management information and accounting. Future plans are for on line processing.

If you would like to be considered for any of the above vacancies, please phone for an Application Form. Alternatively, please phone for details of positions in your area of interest.

## AMES PERSONNEL

Employment Agency Suite 14, Dryden Chambers,  
119, Oxford Street, London, W1R 1PA. Tel: 01-434 1106

## UNIVERSITY OF SALFORD

### COMPUTING LABORATORY

#### TWO VACANCIES

exist in the Applications and User Services' Group which supports users on the University's ICL 1904S and PRIME computers, as well as their use of other machines in the North West. Duties will include development of applications packages, particularly those with a graphics orientation, giving programming advice, and some documentation work. Should a suitable candidate be available, an appointment will be made at the Grade II level, and will carry considerable responsibility for supervision of documentation, and other administrative duties, but both appointments only be made at the Grade IA level.

Salary £6317-£7754 (Grade II) or £3863-£4655 (Grade IA).

Further particulars and application forms may be obtained from the Registrar, University of Salford, Salford, Greater Manchester M6 6PU. To be considered for appointment, applications should be received by 30th November 1978, quoting reference CL/58/0N.

## CAPITAL APPTS.

PORTMAN  
Programmer usually required for industrial and scientific development. £2,800-£3,000 p.a. ALL AREAS. Please write to us of your interest.

037 3557 646/636 9652 ext.

## COMPILER DESIGNERS

### COMPILERS & OPERATING SYSTEMS DESIGNERS & WRITERS, OXFORD

Our client requires a highly motivated and down-to-earth specialist in the design and development of advanced compiler and operating systems for the IBM, ICL, and other mainframe computers. Previous in-depth experience in a postgraduate or research environment is essential. Our brief is to discover potential candidates with several years' current relevant experience for which our client expects to pay well above accepted market rates. These positions are permanent and relocation expenses will be covered. Full interview applications. The client is a multi-leader in advanced systems products and is fully interested in the development of new products. Offices throughout Europe, Australia and the USA. Interviews can be held either in Oxford or at the client's Head Office in London. Salaries will be in the £10,000-£15,000 p.a. range. Other appointments £7-8M p.a. For an early interview, please telephone 01865 241111 or 01865 241112.

